Expectant Management of Early-Onset Preeclampsia With Severe Features

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Learning Objectives: After participating in this CME activity, the obstetrician/gynecologist should be better able to:
1. Describe the epidemiology and risk factors for early-onset preeclampsia with severe features.
2. Identify acceptable candidates for expectant management in preeclampsia with severe features at less than 34 weeks’ gestation.
3. Determine appropriate antepartum management plans for patients with preeclampsia with severe features at less than 34 weeks’ gestation.
4. Describe indications for and route of delivery for women with early-onset preeclampsia with severe features.

Key Words: Preeclampsia, Preeclampsia with severe features

Preeclampsia complicates approximately 3% to 5% of pregnancies, and it is a leading cause of maternal and perinatal morbidity and mortality. The definitive cure for preeclampsia is delivery, and there is no direct maternal benefit to expectant management. Preeclampsia most often occurs at or close to term and prompt delivery is recommended, as any benefits of deferring delivery are not justified by the maternal and fetal risks.

The onset of preeclampsia in the second trimester or early third trimester is less common; however, it accounts for substantial perinatal morbidity and mortality, in large part due to prematurity. Studies in the 1990s evaluated the safety and benefit of expectant management of severe preeclampsia before 34 weeks’ gestation. In women between 24 and 34 weeks’ gestation, expectant management is associated with improved neonatal outcomes when compared with immediate delivery or delivery upon completion of corticosteroids. This was accomplished without a significant increase in maternal complications. However, expectant management of severe preeclampsia before 23 to 24 weeks’ gestation was associated with poor fetal outcomes and increased maternal morbidity.

Therefore, although there is no direct maternal benefit to expectant management of preeclampsia with severe features, with appropriate patient selection and management, expectant management can result in improved neonatal outcomes with acceptable risks. Balancing the maternal risk and neonatal benefits of expectant management in the setting of severe preeclampsia is often challenging and represents a gap in routine, established practice. The goals of this article are to describe the epidemiology of early-onset preeclampsia with severe features, to discuss candidates for expectant management, and to review antepartum management and indications for delivery.

Definition and Terminology

In 2013, the American College of Obstetricians and Gynecologists created a Task Force on Hypertension in Pregnancy aimed at addressing important issues related to diagnosis, management, and terminology of preeclampsia. Preeclampsia with severe features is defined as new-onset...
Elevated blood pressure after 20 weeks’ gestation with any one of the criteria listed in Table 1. A significant change made by the task force is that the presence of proteinuria is no longer required to establish the diagnosis of preeclampsia and there is no specified quantity of proteinuria included in the criteria to establish a diagnosis of preeclampsia with severe features. This change was based on studies showing that the amount of proteinuria was not significantly related to pregnancy outcome. In addition, fetal growth restriction is no longer an indicator of severe disease, as it is managed similarly in women with and without preeclampsia.

**Epidemiology, Incidence, and Risk Factors**

In the United States the incidence of preeclampsia is 3% to 5%, with the majority of cases occurring after 34 weeks’ gestation. Preeclampsia with severe features occurs in approximately 1% of all pregnancies, and at less than 34 weeks’ gestation in 0.3% of pregnancies. Rates of preeclampsia and early-onset preeclampsia have increased over the past 3 decades.

Multiple conditions have been associated with an increased risk of both preeclampsia with severe features and early-onset disease. These include hypertension (relative risk (RR) 5.4, 95% confidence interval (CI) 1.4–2.3 for early-onset disease; RR 6.2, 95% CI 4.2–9.1 for severe disease), obesity (RR 2.1 for both early-onset and severe disease), diabetes (RR 3.7 and 1.7 for early-onset and severe disease, respectively), and multiple gestation (RR 5.9 and 2.6 for early-onset and severe disease, respectively). Additional risk factors for early-onset preeclampsia with severe features include a history of preeclampsia, chronic renal disease, systemic lupus erythematosus, and antiphospholipid antibody syndrome.

The increase in early-onset preeclampsia during the past several years may be related to increasing rates of obesity and increased use of assisted reproductive technology, associated multifetal pregnancies, and pregnancies in women of advanced maternal age.

<table>
<thead>
<tr>
<th>Table 1. Severe Features of Preeclampsia</th>
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<tr>
<td>Systolic blood pressure ≥160 mm Hg or diastolic blood pressure ≥110 mm Hg, 2 readings at least 4 hrs apart, or sooner if antihypertensive therapy is required</td>
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<tr>
<td>Thrombocytopenia (platelet count &lt;100,000/μL)</td>
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<tr>
<td>Impaired liver function—liver enzyme concentrations twice the upper limit of normal, severe right upper quadrant or epigastric pain not due to another diagnosis and resistant to medical therapy, or both</td>
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<tr>
<td>Worsening renal insufficiency—serum creatinine &gt;1.1 mg/dL, or doubling of baseline serum creatinine (without underlying renal disease)</td>
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<tr>
<td>New-onset visual or cerebral disturbance</td>
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<tr>
<td>Pulmonary edema</td>
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Adapted from American College of Obstetricians and Gynecologists.

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Maternal Complications of Preeclampsia With Severe Features

Serious maternal complications related to preeclampsia include development of eclampsia, pulmonary edema, severe hypertension, liver failure, hepatic rupture, renal failure, cerebral hemorrhage, retinal detachment, posterior reversible encephalopathy syndrome, placental abruption, disseminated intravascular coagulation (DIC), and death. Studies evaluating maternal complications during expectant management of preeclampsia with severe features report eclampsia rates ranging from 0% to 5.6%, HELLP syndrome in 4.1% to 27.1%, and pulmonary edema in 0% to 8.5%. The broad ranges in reported complications can be explained by limitations of the individual studies, including sample size, and differences in diagnostic criteria for reported complications (ie, thrombocytopenia included in calculations of HELLP syndrome). Several of these studies, both randomized controlled trials and observational, suggest expectant management is associated with improved perinatal outcomes with overall low maternal risk in appropriately selected, closely monitored women.

Perinatal Complications of Preeclampsia With Severe Features

Preeclampsia with severe features is associated with an increased risk of fetal growth restriction, stillbirth, placental abruption, oligohydramnios, nonreassuring fetal status, cesarean delivery, and preterm delivery. Neonatal complications are primarily related to prematurity and fetal growth restriction; these include perinatal death, respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, and neonatal intensive care unit admission.

The risk of adverse outcomes is inversely correlated to both gestational age at diagnosis and gestational age at delivery. Bombrs et al reported a series of 46 women with expectantly managed preeclampsia with severe features diagnosed at less than 27 weeks’ gestation. Of the pregnancies admitted at less than 23 weeks (7 fetuses), none resulted in perinatal survival. Perinatal survival increased from only 20% at the gestational age 23 to 23½ weeks to 74% for all pregnancies admitted at 24 weeks or more.

Initial Evaluation and Diagnosis

Initial evaluation of a patient suspected of having preeclampsia includes a thorough medical and obstetric history, physical examination, establishment of the estimated gestational age, and evaluation of fetal well-being. Diagnosis of preeclampsia is established by either: 1) new-onset systolic blood pressure 140 mm Hg or higher or diastolic blood pressure 90 mm Hg or higher (two readings >4 hours apart) after 20 weeks’ gestation; or 2) systolic blood pressure 160 mm Hg or higher, or diastolic blood pressure 110 mm Hg or higher, documented in a shorter period to allow treatment with antihypertensive medications, in combination with any of the following:

- Proteinuria—24-hour urine protein level 300 mg or more, protein/creatinine ratio 0.3 or more, or dipstick with 1+ protein;
- Thrombocytopenia—platelet count less than 100,000/μL;
- Renal insufficiency—serum creatinine more than 1.1 mg/dL or a doubling from baseline (without renal disease);
- Elevated liver transaminases—twice the normal values;
- Pulmonary edema; and
- Cerebral or visual symptoms.

Laboratory evaluation can also include uric acid, coagulation factors, lactate dehydrogenase, and/or a peripheral smear. An ultrasound should be performed to evaluate fetal growth and/or gestational age, amniotic fluid volume, presentation, and umbilical artery Doppler indices as indicated.

The diagnosis of preeclampsia with severe features is established by the presence of the criteria listed in Table 1 in the setting of preeclampsia. The differential diagnosis in women suspected of having preeclampsia with severe features is broad and includes HELLP syndrome, acute fatty liver of pregnancy, exacerbation of preexisting renal disease or systemic lupus erythematosus, thrombotic thrombocytopenic purpura, hemolytic uremic syndrome, and antiphospholipid antibody syndrome. It is of primary importance to consider and exclude these conditions, as the management may be dramatically different.

Initial Management

Upon establishing a diagnosis of preeclampsia with severe features, the gestational age, maternal condition, and fetal condition all need to be carefully considered to determine whether immediate delivery is indicated (Table 2). We admit women to labor and delivery for intensive monitoring of maternal vital signs and with continuous fetal monitoring if indicated. Early consultation with maternal-fetal medicine, anesthesia, and neonatology should all be considered. If the fetal heart rate tracing is not reactive, we perform a biophysical profile. IV magnesium sulfate should be initiated for seizure prophylaxis, during the period of initial observation while expectant management is being considered. Magnesium sulfate administration has the additional benefit of fetal neuroprotection for those undergoing delivery at extremely premature gestational ages. We generally administer a 4-g load over 20 minutes followed by a continuous infusion of 2 g per hour, in women with normal renal function. Antihypertensive therapy should be initiated and continued to maintain blood pressures less than systolic of 160 mm Hg or diastolic of 110 mm Hg. When the gestational age is between 23 and 34 weeks’ gestation and delivery within 6 to 12 hours is not expected, corticosteroids should be administered to reduce neonatal morbidity and mortality.

Selection of Candidates for Expectant Management

The risks and benefits of immediate delivery versus expectant management need to be carefully considered and discussed with the patient. Gestational age, maternal
Table 2. Exclusion Criteria for Expectant Management*

<table>
<thead>
<tr>
<th>Maternal Indications</th>
<th>Fetal Indications</th>
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<tbody>
<tr>
<td>Eclampsia</td>
<td>Nonreassuring fetal status (nonreassuring fetal heart tracing or abnormal biophysical profile)</td>
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<td>Severe neurologic symptoms (worsening headache despite medical therapy, scotomata, etc)</td>
<td>Fetal death</td>
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<td>Persistent severe hypertension resistant to medical therapy</td>
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<td>Pulmonary edema</td>
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<tr>
<td>Progressive thrombocytopenia (platelets &lt;100,000/(\mu L))</td>
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<tr>
<td>Progressive renal failure—increasing creatinine or oliguria despite resuscitation measures</td>
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<tr>
<td>Worsening liver function—AST and ALT twice the upper limit of normal and increasing; severe epigastric or right upper quadrant pain despite medical therapy or alternative diagnoses</td>
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<tr>
<td>Disseminated intravascular coagulopathy</td>
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<tr>
<td>Placental abruption</td>
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*Corticosteroids may be given, but delivery should not be postponed.\(^2,6,13,14\)

ALT, alanine transaminase; AST, aspartate transaminase.

well-being, and fetal well-being are all considered when determining the appropriateness of expectantly managing preeclampsia with severe features. As previously noted, the direct benefits of expectant management are limited to the fetus, and there is no direct maternal benefit. The risks and benefits of delivery and expectant management should always be carefully considered, discussed with the patient, and documented in the medical record. Our general approach is to categorize women into one of the following categories:

1. Expectant management is contraindicated and prompt delivery is recommended;
2. Expectant management is reasonable to allow administration of corticosteroids, followed by planned delivery; or
3. Expectants management is reasonable until delivery is indicated based on gestational age, maternal condition, or fetal condition.

**Expectant Management Is Contraindicated**

We recommend maternal stabilization followed by prompt delivery for women who have preeclampsia with severe features before fetal viability, after 34 weeks’ gestation, with fetal demise, or when the maternal or fetal condition is unstable regardless of the gestational age, and whether or not corticosteroids have been administered.\(^4,6,13\) Perinatal survival rates in patients admitted for expectant management of preeclampsia with severe features before 23 weeks’ gestation have been reported to be 0% in several studies.\(^4,13\) Expectant management at less than 23 weeks is also associated with a higher risk of maternal morbidity than expectant management at more advanced gestational ages.\(^4,13\) The minimal benefits of expectant management at or beyond 34 weeks of gestation do not justify the maternal and fetal risks. The decision regarding whether or not to proceed with prompt delivery or expectant management at perivable gestational ages is particularly challenging and requires careful consideration of a variety of clinical factors, and extensive counseling regarding the risks, benefits, and anticipated possible neonatal outcomes related to extreme prematurity.

Unstable maternal or fetal status is generally considered a contraindication to expectant management; maternal stabilization followed by timely delivery via induction of labor or cesarean section is recommended. Eclampsia, pulmonary edema, uncontrollable severe hypertension, shock, nonreassuring fetal status, placental abruption, or DIC all warrant prompt delivery and expectant management should not be pursued. Determining whether maternal or fetal status is sufficiently stable can be challenging and at more advanced gestational ages the threshold for delivery should be lower. If delivery within 6 to 12 hours is not expected, corticosteroids should still be administered.

**Expectant Management to Administer Corticosteroids**

If there are no indications for immediate delivery then the patient is admitted to labor and delivery for the first 24 to 48 hours, and corticosteroids are administered to reduce neonatal morbidity and mortality. This requires close monitoring in hospitals equipped with adequate intensive care for the mother and neonate.\(^5,9,13\) During the initial evaluation and any time that acute antihypertensive therapy is required, we recommend continuous fetal monitoring. For women with any of the conditions listed in Table 3, delivery 48 hours after administration of corticosteroids is recommended.\(^5,9,13\) If HELLP syndrome or laboratory abnormalities are found, such as a platelet count of less than 100,000/\(\mu L\), transaminases twice or more the upper limits of normal, serum creatinine greater than 1.1 mg/dL, expectant management to administer corticosteroids is recommended. However, we repeat a laboratory evaluation within 4 to 6 hours and then every 6 to 12 hours; if there is a progressive decline in the platelet count or deterioration in renal function, we proceed with delivery. Delivery should be considered for women with persistent severe headache, scotomata, right upper quadrant/epigastric pain, or nausea/vomiting when it is thought that these symptoms
Table 3. Indications for Delivery After Corticosteroid Administration*

<table>
<thead>
<tr>
<th>Condition</th>
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<tr>
<td>HELLP syndrome</td>
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<tr>
<td>Thrombocytopenia</td>
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<tr>
<td>Elevated hepatic enzyme levels: ≥ twice the upper limit of normal values</td>
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<tr>
<td>New renal dysfunction</td>
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<tr>
<td>Preterm premature rupture of membranes</td>
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<tr>
<td>Preterm labor</td>
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<tr>
<td>Severe fetal growth restriction: estimated fetal weight &lt;5th percentile</td>
</tr>
<tr>
<td>Persistent oligohydramnios: amniotic fluid index &lt;5 cm or maximum vertical pocket &lt;2 cm</td>
</tr>
<tr>
<td>Persistent reverse end-diastolic flow on umbilical artery Doppler ultrasonography</td>
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*Delay 48 hours for corticosteroid administration, if possible.6,13,14

are a result of preeclampsia and do not resolve with supportive care.

Expectant Management

Women without criteria for immediate delivery or delivery within 48 hours are considered for further expectant management. Once the decision is made to defer delivery, we discontinue magnesium sulfate, maintain oral antihypertensive therapy, and proceed with inpatient management for the duration of the pregnancy as described in the next sections.

Antepartum Management

Once the patient has been stable for 24 to 48 hours, we consider transfer from labor and delivery to the antepartum unit. Magnesium sulfate is discontinued and oral antihypertensive therapy is continued with a treatment goal of blood pressures 140 to 155 mm Hg systolic and 90 to 105 mm Hg diastolic.9 Expectant management is pursued until the patient either reaches a gestational age of 34 weeks or develops an indication for delivery.

Maternal monitoring includes evaluating vital signs, fluid intake, and urine output at least every 8 hours.6,9,13 Similarly, women should be evaluated for symptoms of preeclampsia and preterm labor. Complete blood cell count, liver transaminases, and serum creatinine should be checked daily, and if the patient and her laboratory values remain stable they can be checked every other day. Fetal assessment includes daily nonstress tests and fetal kick counts with weekly or twice weekly assessment of the amniotic fluid volume.2,3,5 Serial ultrasounds to assess fetal growth should be performed every 2 to 3 weeks.2,3,5 and if fetal growth restriction is suspected we obtain umbilical artery Doppler studies weekly. If in 2 weeks after administration of corticosteroids the patient remains pregnant, a second course of antenatal corticosteroids should be considered.

Antihypertensive therapy can be adjusted as necessary to prevent severe hypertension. However if blood pressures become persistently severely elevated, the patient should be brought back to the labor and delivery unit for acute antihypertensive therapy, fetal monitoring, and consideration of delivery.6,9,13

If any contraindication to expectant management develops (see Tables 2 and 3), then delivery is indicated. In addition, delivery is indicated for women with recurrent severe hypertension. The determination as to further increasing antihypertensive therapy versus proceeding with delivery can often be challenging. This decision is dependent on multiple factors including gestational age, antihypertensive regimen and dosing, and severity of the hypertension, among other considerations.

Delivery

When a decision for delivery is made, magnesium sulfate should be restarted, and continued for at least 24 hours after delivery.13 The infusion should not be discontinued before or during cesarean delivery. Route of delivery depends on multiple factors including gestational age, maternal and fetal status, obstetric history, cervical examination, future pregnancy plans, patient preference, and routine obstetric indications (eg, malpresentation, placenta previa, and previous uterine surgery). A retrospective review of 491 women with early-onset severe preeclampsia found that of the 57.4% of women who underwent induction of labor, gestational age was a primary indicator of success. Vaginal delivery occurred in 68.8% of women induced at 32 to 34 weeks, 47.5% at weeks 28 to 32 weeks, and only 6.7% when labor was induced between 24 and 28 weeks. There was no increase in neonatal morbidity or mortality associated with induction of labor.15 In the setting of fetal growth restriction, especially with abnormal umbilical artery Doppler indices, the probability of a successful induction is lower and the risks of an adverse perinatal outcome are higher. If a decision for induction of labor is made, the process should not be prolonged, with a goal of delivery within 24 hours.13 No randomized trials comparing induction of labor to elective cesarean delivery exist to date.

Anesthesia

As mentioned previously, all patients admitted for expectant management of preeclampsia with severe features should have early consultation with the anesthesiology team. Neuraxial anesthesia is typically preferred to general anesthesia. A recent platelet count should be reviewed before proceeding with regional anesthesia. The lower limit of platelet count that is considered safe for administration of spinal or epidural anesthesia is unknown.5,16 The American Society of Anesthesiologists recommends consideration of early insertion of a neuraxial catheter in patients with preeclampsia to reduce the risk of general anesthesia administration in emergency situations.16

Postpartum Management

With delivery as the treatment for preeclampsia, maternal blood pressure should decrease within 48 hours; however, it often increases again 3 to 6 days postpartum.17 Many women will require continuation of antihypertensive therapy in the postpartum period. The American College of Obstetricians and Gynecologists Task Force Report on
Hypertension in Pregnancy recommends antihypertensive therapy if blood pressures are 150 mm Hg or more systolic or 100 mm Hg diastolic on 2 occasions 4 to 6 hours apart.\textsuperscript{6,18} Nonsteroidal analgesics can aggravate hypertension, and their use is discouraged.\textsuperscript{6} Magnesium sulfate should be continued in the postpartum period, typically for at least 24 hours,\textsuperscript{13} or longer depending on maternal status. It is recommended that blood pressure monitoring continue for at least 72 hours postpartum, and again in the outpatient setting in 7 to 10 days.\textsuperscript{6} Women should be thoroughly counseled on signs and symptoms of worsening preeclampsia and told to report this to their provider.

**Future Pregnancy**

A history of preeclampsia is a major risk factor for preeclampsia in future pregnancies (RR 13 and 18 for early-onset and severe disease, respectively).\textsuperscript{3,10} For women with preeclampsia resulting in preterm delivery, the risk of recurrent preeclampsia is in the range of 25% to 65%.\textsuperscript{19,20} The risk is higher for women with earlier onset disease, and the risk of preeclampsia reoccurring in the second trimester is approximately 21% for women with a history of preeclampsia in the second trimester.\textsuperscript{19} Preconception counseling is recommended to optimize maternal health before pregnancy. This includes recommendations for weight loss and exercise, glycemic control in patients with diabetes, and optimization of blood pressure in patients with preexisting hypertension.\textsuperscript{6}

It is also important to encourage patients to seek early prenatal care in future pregnancies for the purpose of obtaining early ultrasounds for accurate dating, baseline laboratory work, blood pressure monitoring, and counseling. Women need close follow-up throughout the pregnancy, with antepartum testing and ultrasounds for monitoring growth, as clinically indicated.\textsuperscript{6} The use of daily low-dose aspirin, starting in the first trimester of pregnancy, is suggested in women with a history of early-onset preeclampsia resulting in delivery at less than 34 weeks’ gestation.\textsuperscript{6}

**Long-Term Health Implications**

Long-term risks associated with preeclampsia include an increased risk of hypertension, cardiovascular disease, cerebrovascular disease, renal disease, and venous thromboembolism.\textsuperscript{21-23} Therefore, screening for hypertension outside the postpartum period is recommended.

Perinatal mortality or abnormal neurodevelopmental outcomes occur in approximately one third of children born after expectant management of severe preeclampsia; this is most closely associated with early gestational age at birth and birth weight.\textsuperscript{24} Data are conflicting as to whether or not neonatal outcomes for infants born prematurely due to preeclampsia are different from those born to normotensive women.\textsuperscript{25-27} Gestational age, the presence of fetal growth restriction, and fetal well-being at the time of delivery are the most useful predictors of perinatal outcome.

**Conclusion**

Although early-onset preeclampsia with severe features occurs rarely, it is associated with significant morbidity and mortality and can be challenging to manage. It is important to understand the maternal and perinatal risks of expectant management and that there is limited data on long-term effects. Larger randomized controlled trials, and research in management of select conditions in association with preeclampsia (eg, fetal growth restriction and HELLP syndrome), are required. On the basis of the available data, in select patients, early-onset preeclampsia with severe features may be managed expectantly for the benefit of the fetus, but this should only take place in facilities equipped with intensive care services and with the expertise of maternal-fetal medicine specialists.

**References**


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1. A previously normotensive 26-year-old G2P1001 at 29 1/7 weeks’ gestation presents to labor and delivery with a headache. Her blood pressure is 210/113. She receives a first dose of corticosteroids, and her blood pressure remains severely elevated despite escalating doses of antihypertensive medications. Which one of the following is the best course of management?
   A. Monitoring and antihypertensive medications
   B. Magnesium sulfate and delivery in 48 hours
   C. Magnesium sulfate administration, followed by expectant management
   D. Magnesium sulfate administration and immediate delivery

2. A 39-year-old G1P0 at 21 1/7 weeks’ gestation presents with a severe headache, vision changes, and systolic blood pressure exceeding 200 mm Hg. She has no history of hypertension or renal disease. Fetal heart rate by ultrasoundography is 145 beats per minute, and the fetus is in breech presentation. A diagnosis of early-onset preeclampsia with severe features is established. After maternal stabilization and counseling, which one of the following is the next best step for management?
   A. Corticosteroid administration
   B. Magnesium sulfate administration and induction of labor
   C. Expectant management
   D. Cesarean section

3. All of the following are risk factors for early-onset severe preeclampsia, except
   A. obesity
   B. multiparity
   C. multiple gestation
   D. diabetes

4. Which one of the following is an indication for immediate delivery after stabilization for a woman with preeclampsia with severe features?
   A. Preterm premature rupture of membrane
   B. Severe fetal growth restriction
   C. Pulmonary edema
   D. Preterm labor

5. A 33-year-old G1P0 at 28 3/7 weeks’ gestation is undergoing expectant management for preeclampsia with severe features. She is taking nifedipine daily for blood pressure control. Which one of the following would be the best option for her targeted blood pressure (in mm Hg)?
   A. <120/80
   B. 120 to 130/80 to 90
   C. 160 to 165/110 to 115
   D. 140 to 155/90 to 105
6. A 29-year-old G1P0101 is being monitored on the postpartum unit on day 1 after delivery of a male infant, who was delivered preterm due to preeclampsia. She has no signs or symptoms of worsening disease. The patient's blood pressure remains mildly elevated at 145 to 155/95 to 100 mm Hg. Her medications include acetaminophen, ibuprofen, iron, and Colace. Which one of the following is the next best step in management of this patient?
   A. Elimination of nonsteroidal anti-inflammatory agents
   B. Expectant management
   C. Addition of antihypertensive therapy
   D. Magnesium sulfate administration

7. A 34-year-old G2P0202 presents for preconception counseling. She has a history of 2 pregnancies complicated by preeclampsia with severe features requiring preterm delivery. Her medical history includes diabetes and hypertension, and her body mass index is 41. Which of the following is/are appropriate management of this patient?
   A. Strict glycemic control before conception
   B. Optimization of antihypertensive therapy
   C. Weight loss
   D. All of the above

8. In a patient diagnosed with preeclampsia with severe features, delivery can be deferred for 48 hours after corticosteroid administration, pending stable maternal and fetal status, in the setting of maternal
   A. DIC
   B. HELLP syndrome
   C. eclampsia
   D. persistent oliguria

9. In combination with hypertension, all of the following are criteria for preeclampsia with severe features, except
   A. creatinine level higher than 1.1 mg/dL
   B. liver enzymes higher than 2 times the upper limit of normal
   C. massive proteinuria (>5 g of protein in 24-hour urine collection)
   D. platelet count lower than 100,000/µL

10. A 21-year-old G1P0 at 32 weeks’ gestation presents with severely elevated blood pressure and a headache that she rates as 9 on a 10-point pain scale. Laboratory testing reveals only proteinuria, and she is diagnosed with preeclampsia with severe features. Treatment with magnesium sulfate is initiated. The patient is administered acetaminophen, with full resolution of her headache. Her blood pressure is controlled with labetalol. Close inpatient monitoring confirms that maternal and fetal status remain stable. Which one of the following is the appropriate time when delivery should occur?
    A. Immediately after maternal stabilization
    B. 48 hours after administration of corticosteroids
    C. At 37 weeks’ gestation, unless the patient develops an indication for delivery
    D. At 34 weeks’ gestation, unless the patient develops an indication for delivery