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HYPERTENSIVE DISORDERS IN PREGNANCY: AN UPDATE

MARK W. TOMLINSON, MD, MBA AND LISA J. FARKOUH, MD

Improving maternal pregnancy outcomes has received increasing emphasis recently, due in part to a near doubling of maternal mortality rates in the U.S. over the last several years.[1,2] Mortality represents just the 'tip of the iceberg,' with an estimated 50-100 near misses or severe morbidity cases occurring for every maternal death.[3]

Hypertension-related disorders in pregnancy are a leading cause of maternal mortality. Reviews of these cases often reveal that care was suboptimal and many of those deaths were preventable.[4] In an effort to increase awareness of the risk of preventable patient harm, ACOG published a Committee Opinion in February 2015 emphasizing the importance of prompt treatment of acute, sustained, severe hypertension (HTN).[5] Additionally, last year Clark et al.[6] reported on an observed decrease in HTN-related maternal mortality due to the introduction of a simple protocol aimed at prompt treatment. The number of maternal deaths decreased from 15 prior to the introduction of the protocol (2000-2006) to three following the protocol's introduction (2007-2012) among more than 1.2 million births in each period.

Further emphasizing the importance of care of HTN in pregnancy, ACOG recently published a monograph entitled *Hypertension in Pregnancy*[3] to summarize the available literature relating to hypertensive disorders in pregnancy and compile the information into practice guidelines. Our goal in this edition of *Perinatal Progress* is to summarize key points found in the ACOG document and highlight important changes from previous guidelines and common practices. For greater detail, please refer to the *Hypertension in Pregnancy* publication.[3]

Although the ultimate treatment of pregnancy-associated hypertensive disorders is delivery, the optimal timing of delivery requires careful consideration of both fetal concerns and the severity of maternal disease. **Simply, beginning at 37 weeks' gestation all patients developing HTN-related disorders of pregnancy (including those with gestational HTN) should be delivered.** The need for earlier delivery is determined by the severity of disease and the fetal condition. In the past, gestational HTN had been considered to be associated with a lower risk of adverse outcomes; however, many women diagnosed with only "gestational" HTN may just have not yet manifested either proteinuria or other features of preeclampsia. Since neonatal morbidity in early term gestations is low, the risk/benefit ratio favors delivery.

Women with severe disease between 34-37 weeks should be delivered, while those without evidence of severe disease can be managed expectantly until 37 weeks. Prior to 34 weeks, the incidence of both maternal and fetal adverse outcomes is increased, and maternal risks must be balanced with fetal risks for prematurity. Expectant management of preeclampsia without severe features prior

FIGURE 1: DIAGNOSTIC CRITERIA FOR PREECLAMPSIA[3]

Blood pressure	• **Mild:** ≥ 140 mmHg systolic or ≥ 90 mmHg diastolic on two occasions at least 4 hours apart after 20 weeks gestation in a woman with a previously normal blood pressure. • **Severe:** ≥ 160 mmHg systolic or ≥ 110 mmHg diastolic, hypertension can be 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 (each measured as mg/dL) • Dipstick reading of 1+ (used only if other quantitative methods not available)
OR	
In the absence of proteinuria, new-onset HTN with new onset of one or more:	
Thrombocytopenia	• Platelet count < 100,000/microliter
Renal insufficiency	• Serum creatinine > 1.1 mg/dL or a doubling of the serum creatinine in the absence of other renal disease
Impaired liver function	• Elevated liver transaminases to twice the upper limit of the normal concentration range.
Pulmonary edema	
Cerebral or visual symptoms	

to term will be briefly discussed later; however, details of expectant management of preeclampsia with severe features prior to 34 weeks, as well as a discussion of the management of chronic hypertension and superimposed preeclampsia, are beyond the scope of this review.

There are important changes to the **diagnostic criteria for preeclampsia (Figure 1)** and the definition of severe disease. The blood pressure (BP) criteria remain the same. The criteria for proteinuria have been revised. A protein/creatinine ratio of 0.3 or more is now an alternative to the 24-hour urine collection; however, due to the lower sensitivity and specificity associated with the protein/creatinine ratio, we at NWP recommend using the 24-hour collection when feasible. The traditional use of urine dipstick results is reserved for cases where quantitative methods are not practical or available due to both false positive and negative results. It has long been recognized the amount of proteinuria correlates poorly with pregnancy outcomes. As a result, five grams in 24 hours is no longer considered evidence of severe disease. In addition, **preeclampsia can be diagnosed with new-onset HTN in the absence of proteinuria when other severe features are present, including:**

- **Thrombocytopenia:** platelet count <100,000
- **Impaired liver function:** elevated blood levels of liver transaminases to twice the normal concentration, severe persistent RUQ or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both
- **New development of renal insufficiency:** elevated serum creatinine greater than 1.1 mg/dL, or doubling of serum creatinine in the absence of other renal disease
- **Pulmonary edema**
- **New-onset cerebral or visual disturbances**

A diagnostic criterion for creatinine has not been universally included in other guidelines and has now been added. Finally, uric acid is not used to diagnose preeclampsia and is not included in any of the recommendations.

Predicting preeclampsia has received a considerable amount of attention in recent years. Despite promising biomarkers and Doppler ultrasound, a detailed history to screen for risk factors is all that is currently recommended. There have been a number of preventive therapies studied, including vitamins C and E, salt restriction and low-dose aspirin (60-80 mg). Of these therapies, only aspirin has been shown to have modest benefit in "high risk" women. High risk has been variously defined with only limited support for various high risk factors. As such, **ACOG recommends starting low-dose aspirin during the late 1st trimester in women with two or more prior pregnancies with preeclampsia or when preeclampsia has led to delivery prior to 34 weeks.**

Once preeclampsia has been diagnosed, management should be based on gestational age and severity of the disease. Women prior to 37 weeks without severe features can be monitored as outpatients 1-2 times weekly for fetal surveillance and BP assessment, along with platelet and transaminase checks weekly. We recommend considering 1-2 days of observation in hospital with the initial diagnosis and if severe hypertension is noted in the office. Corticosteroids can be given during this observation period for fetal indications. We have found home BP monitoring of value and, if normal, it may decrease the need for hospital admission in patients with higher BPs during office visits.

Antihypertensive therapy has been commonly used in women with elevated BPs during pregnancy. It may reduce the risk of developing severe HTN while potentially increasing the risk of fetal growth restriction. There is no decrease in the risk of preeclampsia, pulmonary edema, perinatal death or preterm birth. As such, **it is recommended that antihypertensive therapy not be prescribed to women diagnosed with gestational HTN or preeclampsia if BPs are persistently less than 160/110. Bed rest has not been shown to be of value either, and should not be used in the absence of severe features.**

Once the decision is made for delivery, magnesium sulfate should be started for seizure prophylaxis in patients with severe features. For cesarean delivery, the magnesium sulfate infusion should be continued intra-opera-

Hypertensive disorders, con't...

SUMMARY OF NEW GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF PREECLAMPSIA

Diagnosis of preeclampsia in the absence of proteinuria when other severe features are present
Addition of protein/creatinine ratio >0.3 for diagnosis of preeclampsia
Elimination of the 5g proteinuria diagnostic criterion for severe disease
Use of serum creatinine >1.1 or doubling as a diagnostic criterion for severe disease
Delivery for preeclampsia or gestational HTN after 37 weeks
Expectant management of gestational HTN or preeclampsia without severe features between 34-37 weeks, with delivery at 37 weeks
Delivery for gestational HTN or preeclampsia with severe features at presentation at 34 weeks
Management of preeclampsia with severe features prior to 34 weeks should be individualized
No treatment of HTN in preeclampsia unless BP >160/110

tively. **Magnesium sulfate is not necessary in the absence of severe features due to the estimated low risk of seizures in these patients.**

Management of severe BP elevations is another critical component of antepartum, intrapartum and postpartum care. Acute and persistent (defined as lasting 15 minutes or longer) severe HTN is associated with an increased incidence of maternal stroke and mortality, and it should be treated without delay. Although diastolic HTN has traditionally been felt to be more concerning, severe systolic HTN is the best predictor of adverse neurologic outcome. Either IV labetalol or hydralazine can be used as first-line agents. ACOG has published an example of standing orders for the management of acute severe HTN that has been incorporated into an EPIC order set throughout Providence.[5] Oral nifedipine has also been shown to be effective for acute BP treatment.[7] Its use was included in the recent ACOG publication as an option for first-line therapy,[5] and should be noted in the Providence EPIC order set in the near future.

Although delivery is the ultimate treatment for pregnancy-associated HTN, risks remain in the postpartum period. In-hospital or close outpatient monitoring is recommended for at least three days after delivery followed by an outpatient visit at 7-10 days after delivery. Ibuprofen is associated with increased BPs and should be avoided in patients with persistent HTN after delivery. HTN with severe features will sometimes initially manifest after delivery. Magnesium sulfate and parenteral antihypertensive agents should be used as they are with antepartum patients. The thresholds for initiating oral agents are lower, however, at a systolic of 150 mm Hg or a diastolic of 100 mm Hg.

We realize that these evidence-based recommendations will continue to evolve. To speak with a Northwest Perinatal Center physician for further consultation, contact us at 503-482-1810 (east) or 503-416-7565 (west).

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Meredith K. Williams, MD

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Jeri L. Milanovich, MS , CGC

OUR AUTHORS

MARK W. TOMLINSON, MD, MBA

A Michigan native, Dr. Tomlinson received his medical degree from Wayne State University in Detroit. He completed his OB/GYN residency at Harbor/UCLA Medical Center in Torrance, California and subspecialty training at Wayne State University. He is board certified in OB/GYN and maternal-fetal medicine.

Dr. Tomlinson has served as the Providence Regional Medical Director of Obstetrics since 2007. He has been a member of the Oregon Perinatal Collaborative Steering Committee and the Joint Commission Perinatal Technical Advisory Panel since 2011. Last year, he also began serving on the National Quality Foundation Board.

LISA J. FARKOUH, MD

Dr. Farkouh grew up in New York City. She received her undergraduate degree in biology from Union College and her medical degree from Albany Medical College as part of a six-year accelerated program. She completed her OB/GYN residency at the State University of New York in Stony Brook and her Maternal-Fetal Medicine fellowship at the University of Colorado Health Sciences Center. She is board certified in OB/GYN and maternal-fetal medicine.

Dr. Farkouh worked in Denver as a perinatologist in private practice for 16 years. She also served as the associate director of Maternal-Fetal Medicine at Presbyterian/St. Luke's Medical Center-Rocky Mountain Hospital for Children and as the medical director of the Center for Perinatal Medicine at Exempla St. Joseph Hospital, both in Denver. She joined Northwest Perinatal Center in 2013.

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East Side Office
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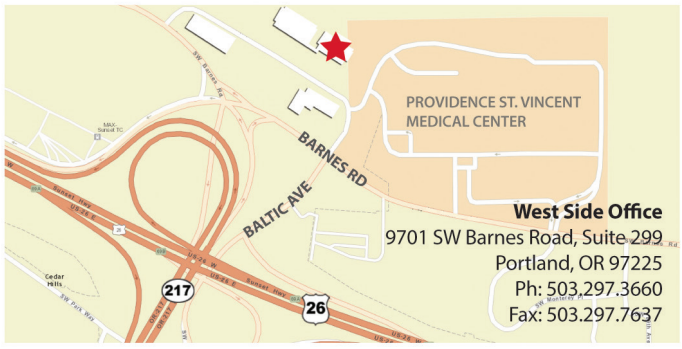
Fax: 503.482.1805



West Side Office
9701 SW Barnes Road, Suite 299
Portland, OR 97225
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We encourage you to add this to your Perinatal Resources notebook provided by Northwest Perinatal Center. Please contact Dr. Tom Lee if you would like to receive a notebook.