

## 37. Screening for Preeclampsia

### RECOMMENDATION

Screening for preeclampsia with blood pressure measurement is recommended for all pregnant women at the first prenatal visit and periodically throughout the remainder of pregnancy (see *Clinical Intervention*).

### Burden of Suffering

Hypertension is a common medical complication of pregnancy, occurring in about 6–8% of all pregnancies.<sup>1,2</sup> It is seen in a group of disorders that include preeclampsia-eclampsia, latent or chronic essential hypertension, a variety of renal diseases, and transient (gestational) hypertension. The definitions used to distinguish these disorders are a matter of debate, leading to uncertainty about their exact prevalence, natural history, and response to treatment.<sup>3,4</sup> Based on 1992 birth certificate data, pregnancy-associated hypertension was noted in 3% of all pregnancies, and eclampsia in 0.4%.<sup>4a</sup>

Preeclampsia and eclampsia, once called toxemias of pregnancy, are the most dangerous of these disorders. Although definitions differ, many describe preeclampsia as acute hypertension (blood pressure greater than 140 mm Hg systolic or 90 mm Hg diastolic; or a rise of 30 mm Hg or 15 mm Hg above the usual systolic and diastolic pressures, respectively) presenting after the 20th week of gestation, accompanied by abnormal edema, proteinuria (more than 0.3 g/24 hours), or both.<sup>4</sup> Women with preeclampsia are at increased risk for such complications as abruptio placentae, acute renal failure, cerebral hemorrhage, disseminated intravascular coagulation, pulmonary edema, circulatory collapse, and eclampsia.<sup>5</sup> The fetus may become hypoxic, increasing its risk of low birth weight, premature delivery, or perinatal death.<sup>6</sup> Complications of pregnancy-induced hypertension, including eclampsia (the advanced stage of this disorder characterized by seizures), are major causes of maternal deaths in the U.S.<sup>7</sup> Women with preeclampsia are not at increased risk of developing chronic hypertension.<sup>4</sup> Individuals at increased risk of developing preeclampsia and eclampsia include primigravidas and women with multiple gestations, molar pregnancy or fetal hydrops, chronic hypertension or diabetes, or a personal or family history of eclampsia or preeclampsia.<sup>8–10</sup>

Other causes of hypertension during pregnancy include transient and chronic hypertension. Transient (gestational) hypertension is defined as the

acute onset of hypertension in pregnancy or the early puerperium without proteinuria or abnormal edema and resolving within 10 days after delivery.<sup>2</sup> Chronic hypertension that had been latent prior to the pregnancy may also become evident during gestation. Pregnant women with latent chronic hypertension are also at increased risk for stillbirth, neonatal death, and other fetal complications, but the risk is much lower than that of women with preeclampsia or eclampsia. Women with transient or latent chronic hypertension are also more likely to develop chronic hypertension in later years.<sup>3,4,8</sup>

### Accuracy of Screening Tests

Screening tests for preeclampsia are difficult to evaluate due to the absence of a “gold standard” to confirm the diagnosis. Glomerular endotheliosis, the renal lesion characteristic of preeclampsia, is present in only about half of patients who meet the clinical criteria for the disease;<sup>11</sup> diagnosis requires an invasive renal biopsy. In addition, the glomerular lesions of preeclampsia are not specific for preeclampsia, having been observed in association with other conditions, such as abruptio placentae and chronic renal disease.<sup>11,12</sup> For practical reasons, most studies of potential screening tests for preeclampsia have relied on clinical criteria to confirm the diagnosis.

Many proposed screening tests have been found unsuitable for early detection of preeclampsia. The appearance of edema and proteinuria alone is unreliable. Edema is common in normal pregnancies<sup>13,14</sup> and therefore lacks specificity. Measurable proteinuria usually occurs after hypertension is manifested and therefore is not useful for early detection.<sup>2</sup> In a prospective study of women between 24 and 34 weeks of gestation, a urine albumin concentration equal to or greater than 11  $\mu\text{g}/\text{mL}$  had a sensitivity of 50% in predicting subsequent preeclampsia.<sup>15</sup> The conventional urine dipstick test is unreliable in detecting the moderate and highly variable elevations in albumin that occur early in the course of preeclampsia.<sup>16,17</sup> The definitive test for proteinuria, the 24-hour urine collection, is not practical for screening.<sup>17</sup> Because of these considerations, edema is no longer required to diagnose preeclampsia by some experts<sup>5,9,14</sup> and the inclusion of proteinuria is being reconsidered as well. Other tests that have been suggested include the angiotensin II infusion test and the supine pressor “rollover” examination, but these have also been found to be unsuitable, as the former is impractical and the latter lacks adequate sensitivity, specificity, and positive predictive value.<sup>1,17</sup>

The most promising screening test for preeclampsia is sphygmomanometry to detect elevated blood pressure, although there are several problems in relying on blood pressure readings as an accurate predictor. Common sources of measurement error associated with sphygmomanome-

try include instrument defects and examiner technique (see Chapter 3). In addition, maternal posture can significantly affect blood pressure in pregnant women;<sup>17</sup> the results can be erroneous, for example, if blood pressure is measured with the woman in the supine position. Measurements should be taken in the sitting position, after the patient's arm has rested at heart level for 5 minutes.<sup>4</sup> Most important, a single elevated blood pressure reading is neither diagnostic of nor a good predictor for preeclampsia.<sup>1,18</sup> Diagnosis utilizing only a change from baseline also has limited sensitivity (21–52% and 7–23% for the diastolic and systolic criteria, respectively) in predicting preeclampsia.<sup>19</sup> A combination of the blood pressure levels and the change from baseline may be more effective in identifying women at risk for preeclampsia,<sup>20</sup> and the trend in blood pressure over time is more important than a single isolated measurement.

In the middle trimester of pregnancy, the normal decline in blood pressure is often dampened or absent in women who subsequently develop preeclampsia.<sup>6,21</sup> Some experts therefore recommend using the middle trimester mean arterial pressure (MAP)—defined as  $(\text{systolic pressure} + [2 \times \text{diastolic pressure}]) / 3$ —as a screening test.<sup>6</sup> Studies indicate that a middle trimester MAP above 90 mm Hg has a sensitivity of 61–71% and a specificity of 62–74% in predicting preeclampsia,<sup>6,22</sup> and even higher sensitivity and specificity have been reported by some researchers.<sup>23</sup> Other studies report a much lower sensitivity of this test in detecting preeclampsia (22–35%) and suggest it is of little value in predicting eclampsia itself.<sup>24</sup> One review concluded that, due to inconsistencies in the definition of “preeclampsia” used in most of these studies (e.g., failure to require proteinuria for the diagnosis), elevations in second trimester blood pressure may be a better predictor of transient or chronic hypertension than of true preeclampsia.<sup>25</sup>

### Effectiveness of Early Detection

The early detection of hypertension during pregnancy permits clinical monitoring and prompt therapeutic intervention for severe preeclampsia or eclampsia. The delivery of the fetus is considered to be the most definitive method to minimize preeclamptic complications, but other measures (e.g., bed rest and pharmacologic agents) have not been conclusively shown to improve outcome.<sup>17,26</sup> A randomized controlled trial found that antihypertensive therapy and hospitalization, when compared with hospitalization alone, did not improve maternal or fetal outcome.<sup>27</sup> There have been no clinical trials to determine whether hypertensive preeclamptic women treated early in pregnancy have a better prognosis than those who are not detected early.

Clinical experience, however, suggests that early detection and treatment of preeclampsia is beneficial to the patient and fetus.<sup>1,5,9,14</sup> This view is based in part on inferences drawn from the apparent effectiveness of regular prenatal care in reducing the complications of preeclampsia-eclampsia. Studies conducted as early as the 1940s suggested an inverse relationship between the extent of prenatal care and the incidence of eclampsia, perhaps reflecting benefits of early detection.<sup>28</sup> These findings do not provide direct evidence that better outcomes are due solely to blood pressure screening itself, rather than to other components of prenatal care or to the characteristics of women who receive regular prenatal care.

### Recommendations of Other Groups

The American College of Obstetricians and Gynecologists recommends blood pressure measurements at the initial visit, every 4 weeks until 28 weeks' gestation, every 2–3 weeks until 36 weeks' gestation, and weekly thereafter.<sup>29</sup> The Canadian Task Force on the Periodic Health Examination recommends that systolic and diastolic blood pressures be measured on all obstetric patients at the first prenatal visit and periodically throughout the remainder of pregnancy.<sup>30</sup> A task force report to the U.S. Public Health Service recommended blood pressure measurements at a preconception visit, at the first prenatal visit (at 6–8 weeks' gestation, ideally) and at each prenatal visit after 24 weeks until delivery.<sup>31</sup>

### Discussion

The most efficacious screening strategy for preeclampsia is the early detection of an abnormal blood pressure trend over time. Serial measurements during the second and third trimester increase the likelihood that a pathologic pattern or overt blood pressure elevation will be detected.<sup>5,6,18,22,32</sup> Although there is no direct proof that regular screening results in reduced maternal or perinatal morbidity and mortality, it is unlikely that a study will be conducted in which a control group does not receive blood pressure screening or treatment. Because the target condition is a common medical complication of pregnancy and the screening test is simple, inexpensive, and acceptable to patients, screening is indicated on an empirical basis.

Consistent attention should be given to using proper technique for measuring blood pressure.<sup>4</sup> Although the use of isolated specific blood pressure levels (e.g., above 140/90 mm Hg) has an important role in evaluating patients, more definitive data are needed to determine its positive predictive value in the diagnosis of preeclampsia.<sup>20</sup> Measurement of blood pressure and calculation of the MAP during the second trimester may also provide useful information prior to the development of preeclampsia-

eclampsia, but more reliable data are needed to determine the positive predictive value of second trimester blood pressure and whether screening based on these criteria results in improved clinical outcome.

Several therapeutic agents are being investigated as preventive measures for preeclampsia. Aspirin prophylaxis for the prevention of preeclampsia and its complications is discussed elsewhere (see Chapter 70). Calcium supplementation is currently being evaluated.<sup>4,5,14</sup>

#### CLINICAL INTERVENTION

Screening for preeclampsia with blood pressure measurement is recommended for all pregnant women at the first prenatal visit and periodically throughout the remainder of pregnancy ("B" recommendation). The optimal frequency for measuring blood pressure in pregnant women has not been determined and is left to clinical discretion; it is most efficient to measure blood pressure on women who are being seen by their clinicians for other reasons. The collection of meaningful blood pressure data requires consistent use of correct technique and a cuff of appropriate size. In addition to the guidelines listed in Chapter 3, the patient should be in the sitting position and the blood pressure should be measured after the patient's arm has rested at heart level for 5 minutes.<sup>4</sup> Further diagnostic evaluation and clinical monitoring, including frequent blood pressure monitoring and urine testing for protein, are indicated if blood pressure does not decrease normally during the middle trimester, if the systolic pressure increases 30 mm Hg above baseline or the diastolic pressure increases 15 mm Hg above baseline, or if the blood pressure exceeds 140/90 mm Hg. Medical interventions should not be prescribed until the diagnosis of preeclampsia is confirmed. See Chapter 70 for recommendations on the use of aspirin prophylaxis in pregnancy.

The draft update of this chapter was prepared for the U.S. Preventive Services Task Force by Michelle Berlin, MD, MPH, and A. Eugene Washington, MD, MSc.

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