Obstetric Applications Studied for Heart Failure Test

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NEW ORLEANS — Measurement of B-type natriuretic peptide levels in pregnancy shows promise for the management of preeclamptic patients, Vikas Bhalla, M.D., said during the annual scientific sessions of the American Heart Association.

The plasma B-type natriuretic peptide (BNP) test is a rapid, relatively inexpensive point-of-care test approved for diagnosis of heart failure in patients presenting with shortness of breath to the emergency department and other acute care settings. In this setting, BNP level correlates with wedge pressure, severity of heart failure, and prognosis.

Potential obstetric applications under study include use of the BNP test to identify women with preeclampsia before they become hypertensive and proteinuric, as well as to guide physicians in the particularly thorny problem of when to deliver affected patients, according to Dr. Bhalla of the University of California, San Diego.

BNP is synthesized in cardiac ventricular tissue, primarily in response to volume expansion and pressure overload. Preeclampsia, which complicates 5% of pregnancies and causes considerable maternal and neonatal morbidity, is characterized by markedly increased peripheral vascular resistance, which leads to increasing blood pressure, in turn causing pressure overload in the already volume-overloaded hemodynamic state of pregnancy.

Dr. Bhalla reported on 119 women who underwent serial BNP testing in each trimester of normal pregnancy, 9 mildly preeclamptic patients, 25 women with severe preeclampsia, and 25 normal controls at term.

Plasma BNP stayed in the range of 16-18 pg/mL throughout normal pregnancy, remaining in all cases below 20 pg/mL. Levels in mild preeclampsia were significantly higher, with a median value of 21.1 pg/mL. BNP levels were even higher in severe eclampsia, at a median 88.1 pg/mL.

Statistical analysis showed the best cut-off point for the diagnosis of preeclampsia was a BNP of 40 pg/mL. It yielded a sensitivity of 73%, a specificity of 85%, a positive predictive value of 57%, an accuracy rate of 82%, and—most importantly—a negative predictive value of 92%.

The area under the curve described by the test results was 0.86. That's superior to the performance of tests widely used in obstetrics and gynecology, including the Pap smear and mammography. An area under the curve in excess of 0.9 is considered an excellent test, while 0.8-0.9 is considered very good and 0.7-0.8 is reasonably good, Dr. Bhalla said.

He and his coinvestigators are also accumulating data from a different patient series that suggest a rise in plasma BNP may precede development of the hypertension and proteinuria of preeclampsia.

Dr. Bhalla's coinvestigator Alan S. Maisel, M.D., commented that BNP may be of assistance in "one of the hardest things for ob.gyn. people to determine—which women with preeclampsia have got to get delivered early and which don't."

"We know that BNP probably reflects the endothelial dysfunction that goes along with preeclampsia. And when the BNP starts skyrocketing—in some of the patients we're following the levels get above 200 and 300—that, I believe, is going to lead physicians to start delivering patients earlier," said Dr. Maisel, professor of medicine at UCSD, and director of the coronary care unit and heart failure program at San Diego Veterans Affairs Medical Center.

"Also, when people present in their third trimester with shortness of breath and volume overload, a normal BNP level will tell you that the heart is functioning well, taking care of that volume and not experiencing too much stress. If there's any question about that issue, a simple BNP test will certainly help," added Dr. Maisel.

Obstetricians also are investigating the potential application of BNP as a general screen for underlying heart dysfunction.

"I'm talking to ob. people who are doing studies now and are thinking about using this test, especially in areas where people don't get the maternal health care they normally might get in some of our better hospitals," the cardiologist said. ■