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## NST UPDATE

During the last half of the 20th century maternity care changed dramatically, and perinatal mortality decreased more than four-fold. These advances were influenced by changes in obstetric surveillance using technology and pharmacology. I am going to discuss technology with electronic fetal monitoring in this issue of Progeny.

Many techniques have been used to identify a fetus that may be at risk for hypoxic injury or death. For years, the only ways to assess a fetus were highly invasive and had an increase loss of the fetus, therefore, not widely acceptable. Since the 1970's the fetus has become more accessible with electronic fetal monitoring (EFM) and ultrasound development. The purpose of antepartum testing is either to validate fetal well-being or identify fetal hypoxemia by the presence or absence of one or more biophysical parameters and to intervene before permanent injury or death can occur whenever possible. The efficacy to predict perinatal outcomes for different populations has not been established. The nonstress test (NST) evolved from early evidence that fetal heart rate (FHR) accelerations were highly associated with fetal well-being and that conversely the absence of FHR reactivity was associated with increased risk of perinatal mortality. The NST evolved from the contraction stress test (CST). This was popular in the 1970's because when a CST was negative, there were two accelerations present in 20 minutes. The NST was technically easier, fewer resources were needed, and it could be done in an outpatient or in-patient setting. Thus, it became and remains a primary antepartum assessment of fetal well-being.

The heart rate of a normal, mature fetus accelerates in response to movement or other stimuli, which reflects adequate oxygenation and an intact autonomic nervous system. Accelerations can occur after 20 weeks of gestation but are less frequent and of lower amplitude than those occurring later. The frequency and amplitude of acceleration increase with gestational age and evolve into distinct behavior states. Some studies suggest that 95% of accelerations begin immediately after movement. Larger movements produce greater accelerations. In contrast, the effects of hypoxia

on NST results are unclear because the transition from normal to asphyxia is unclear. As fetal compromise continues, movement decreases and eventually disappears. The FHR variability also decreases. Accelerations become smoother, less frequent, and then disappear.

The criteria defined by ACOG for a reactive NST is as follows: Two accelerations with an amplitude of 15 bpm above the baseline and last for 15 seconds within a 20-minute period. Less than this is nonreactive. There may be factors that affect the accuracy though, such as, gestational age. The fetus is more reactive after 32 weeks, so the significance of early NST's is not clearly understood. The fetus may be asleep, so you should extend the NST for a minimum of 40 minutes. Some studies state that the fetus is asleep 30% of the time. Maternal use of medications also may affect fetal movement as well as the medical and obstetrical condition of the mother. There may be decelerations during the NST, primarily variable decelerations. Some authorities state they occur in one-half to two-thirds of NST's. They can be caused by position of the umbilical cord, meconium stained amniotic fluid, and/or oligohydramnios. ACOG states, "A reactive NST with nonrepetitive variables lasting less than 30 seconds is not indicative of fetal compromise and requires no intervention." A nonreactive NST does require further investigation. There is a problem of consistency in general agreement on monitoring patterns between interobserver and intraobserver. There is a high false positive rate, which means if the NST is nonreactive it does not follow that the fetus is going to have a poor outcome. In fact in one study of term, asphyxiated infants, 63% had no risk factors. In several studies the effects of EFM have shown an increase in C-section rates as the most common outcome. A Meta analysis of 18,000 patients with EFM did show a decrease in newborn seizures from 1.1% to 0.8%. A reactive NST with normal amniotic fluid volume is indicative of fetal well-being in 99% of pregnancies. The NST is much less reliable when nonreactive.

**Conclusion**

The NST continues to be a useful component of antepartum testing and provides some information on its own, but several variables need to be measured as well. The biophysical profile, especially the amniotic fluid measurement, has become another primary means of assessment in the antepartum period. Umbilical artery Doppler velocimetry is another promising measurement to assess fetal well-being. The use of fetal pulse oximetry in labor needs more study and is not supported by ACOG at this time.

The NST is just one piece of the screening puzzle.

*(References available upon request)*

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