International Standards for Symphysis-Fundal Height Based on Serial Measurements From the Fetal Growth Longitudinal Study of the INTERGROWTH-21st Project: Prospective Cohort Study in Eight Countries

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ABSTRACT

Fetal growth assessment is important to identify fetuses with abnormal fetal growth that are at increased risk of perinatal morbidity and mortality. Serial measurement of symphysis-fundal height (SFH) is the recommended, inexpensive, and first-level screening tool in both low- and high-risk pregnancies. However, SFH measurements show a wide range of sensitivities for detecting small for gestational age (SGA) owing to the different measurement methods, charts, and thresholds used to perform an ultrasound scan and the use of uncorroborated menstrual dates that can cause errors in dating and can lead to overestimating the length of gestation.

A prospective longitudinal observational study, the Fetal Growth Longitudinal Study, one of the main components of the INTERGROWTH-21st Project, was conducted on healthy, well-nourished women to develop international SFH standards to improve antenatal care. Of the 13,108 women screened in the first trimester, 4607 met study criteria, and of these, 4321 (93.8%) delivered live singletons without congenital malformations or complications. The median number of SFH measurements in all women was 5.0 (range, 1–7); 3976 (92.0%) women had 4 or more measurements. Analysis of the duplicate SFH measurements obtained from all women showed that the 95% limits of agreement were approximately 1.5 cm. The international standards developed through this study overcome many of the methodological limitations of SFH measurement by
reducing the wide range in sensitivity for the detection of SGA and should reduce the risk of failing to diagnose restricted and excessive fetal growth and help in comparisons across populations. The new international SFH standards in combination with standardized measurement methodology are recommended to improve clinical practice.

EDITORIAL COMMENT

(One of more common complications of pregnancy is abnormal fetal growth with approximately 10% of fetuses identified as too small and another 10% as too big. Now, one of the reasons for these numbers is that we have decided to call less than the 10th centile SGA and greater than 90th centile large for gestational age (LGA), so the rates are not particularly surprising. Once abnormal fetal growth is identified, we have ways to manage both types of abnormal growth to improve outcomes. In particular, women with SGA fetuses can undergo a workup to investigate the etiology, and ongoing testing appears to reduce the risk of stillbirth. While our tools are less honed in the setting of LGA, a recent trial did demonstrate that induction of labor reduced birth injury without increasing the risk of cesarean delivery (Lancet. 2015;385:2600–2605).

It is the identification of fetal growth abnormalities that is challenging. For decades, we have utilized fundal height measurements as the screening tool to identify fetal growth disorders. Unfortunately, fundal height measurement has not consistently been shown to have a high sensitivity for detecting either SGA or LGA neonates. Reported sensitivities of fundal height for predicting SGA range from 17% to 86%, and sensitivities for detection of LGA range from 24% to 98.8%, but with both generally less than 50% (J Matern Fetal Neonatal Med. 2011;24:708–712). One recent study found that by adding serialized measurements to the usual single measurement evaluation. Thus, the finding would be abnormal both if the given measurement was off the weekly standard, but also if there was decreased or no change on subsequent measurements. They found that the intervention group had an increased sensitivity for SGA fetuses as compared with the control group (42.7% vs 24.8%) (Aust N Z J Obstet Gynaecol 2012;52:78–82).

However, when one is evaluating the impact of a screening test, a sensitivity of 80%, 90%, or even 99% is what is expected. While a screening test with a 50% or less sensitivity could be thought of as no better than a coin flip, that is not quite true because fundal height screening generally has a specificity that is 80% to 95%, so fewer false positives than a coin flip. But, certainly, a screening test with a 50% or less sensitivity for a common pregnancy complication is not adequate.

Perhaps the problem with the test is that it came out of common practice as opposed to a careful delineation of norms and identification of clear thresholds that can be used to identify outliers. To that end, the current study was designed to specifically examine the symphysis to fundal height measurement to be better able to identify abnormal fetal growth. The study obtained data from pregnancies with multiple fundal height measurements and plotted these measurements versus week of gestation. Thresholds with 3rd, 5th, or 10th centiles were identified. The good news is that this work has been finally done to identify how fundal heights progress throughout pregnancy, the bad news is that they look almost identical to the existing fundal height thresholds we use, so we won’t likely get much better than we already are with these thresholds. One issue with this study is that because most clinicians know that fundal height is supposed to be the gestational weeks in centimeters, I find that most are biased toward that value when they measure the fundus. As opposed to measuring weight, which is pretty objective, fundal height depends on the identification of the top of the fundus that can vary based on hand placement, therein providing the opportunity for such measurements to be biased.

So, it doesn’t look like fundal height measurements as a screening tool for fetal growth disorders are likely to improve. Why don’t we move to using routine third-trimester ultrasound to evaluate fetal growth in all patients? This is the approach in some European countries, but we have not expanded our use of the third-trimester ultrasound in the United States to all women. There are 2 big objections to universal use. The first is that while we treat an ultrasound-generated estimated fetal weight as exact, it also has a great
deal of uncertainty. In fact, with an ultrasound-estimated fetal weight of greater than 4500 g, less than 50% of such neonates are actually greater than 4500 g, so a relatively poor positive predictive value (N Z Med J. 2006;119:U2146). Similarly, in 1 study, its sensitivity was less than 50% for abnormal fetal growth (Br J Obstet Gynaecol 1987; 94:100–104). As important, though, is that it does not appear that ultrasound use improves outcomes and actually may lead to more intervention. In 1 study, women who received a third-trimester ultrasound ultimately had a higher rate of cesarean delivery, even when you actually controlled for both estimated fetal weight and birth weight.

Ultimately, we have to improve. There was hope that 3-dimensional ultrasound would be better with volumes and that better estimates of fetal weight might be produced, but that has not been borne out to date (Ultrasound Med Biol 2005;31:883–887). Magnetic resonance imaging might be able to estimate volumes better, but the idea of routine magnetic resonance imaging for an estimated fetal weight seems a bit overwhelming. For the time being, improving on standard ultrasound to better identify fetal growth abnormalities is likely the best opportunity to improve screening sensitivity. But, until we can demonstrate better test metrics and improved outcomes, we should not be using this routinely. Meanwhile, we continue to use fundal height screening. Although not a very good screening test, at least we know it is based on data, rather than only anecdote.—ABC

Benefits and Risks of Antiretroviral Therapy for Perinatal HIV Prevention

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