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Fetal growth

K.W.M. Bloemenkamp*

Leiden University Medical Centre, Department of Obstetrics, K6-P-35, P.O. Box 9600, 2300 RC Leiden, The Netherlands

Abstract. Effective monitoring of fetal growth is of major importance in antenatal care. However, the clinical performance of screening methods of fetal growth abnormalities is poor and it is questionable if with current methods, antenatal detection actually improves outcome. Clinical palpation and fundal height measurements have a large range of error when predicting fetal weight. At term, clinical estimates have a significantly higher accuracy than when derived sonographically. Serial measurements of abdominal circumference (AC) and estimated fetal weight (EFW) sonographically, i.e. growth velocities are superior to single estimates of AC or EFW in the prediction of fetal growth restriction and predicting poor perinatal outcome. There is no superior formula when estimating fetal weight. The random errors are the major problem and are large. The accuracy of EFW is compromised by large intra- and interobserver variability. Efforts must be made to minimize this variability. Customized birth weight, ultrasound EFW or customized fundal height charts that are adjusted for important independent physiological variables, such as maternal weight, maternal height, ethnic group and parity, have better sensitivities for identifying small for gestational age (SGA) fetuses and intrauterine growth restriction (IUGR) and have lower false-positive rates and are predictive of poor perinatal events. 3D ultrasound and magnetic resonance imaging (MRI) are claimed to be more accurate in determining fetal volume and, consequently, better in estimating fetal weight. However, both methods are time consuming, expensive and not widely available.

Keywords: Fetal growth; IUGR; Estimated fetal weight; Ultrasound; MRI

1. Introduction

Effective monitoring of fetal growth is of major importance in antenatal care. Complications of fetal growth restriction include stillbirth, prematurity, perinatal morbidity

* Tel.: +31 71 5263360x2872; fax: +31 71 5266741.
E-mail address: K.W.M.Bloemenkamp@lumc.nl.

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and impaired reserve during labour. Macrosomia is associated with birth trauma and neonatal metabolic disturbances [1,2]. These growth disturbances may even have long-term complications for several organ systems extending beyond childhood [3]. Therefore, better surveillance and prevention of deranged fetal growth is likely to result in social and economic benefits.

2. Fetal growth

To assess fetal growth accurately we first have to define what normal is, i.e. what is the optimal growth of a baby. We have to bear in mind that smallness for gestational age (SGA) is not synonymous with fetal growth restriction (FGR) or intrauterine growth retardation (IUGR). It might not be pathological but the result of physiological and constitutional variation. Several variables are known to influence standard growth. First, it is important to determine the due date accurately. Determination of the gestational age by ultrasound is more precise than by first day last period [4]. Determination by first day last period leads to a positive skewed distribution, ending in an increase in post-dates deliveries [5]. During a normal pregnancy the fetus has a constant growth in utero till the due date. For the individual, the growth standard needs to be adjusted for physiological variables that influence birth weight and growth. Some of these variables are height of mother, weight of mother (early in pregnancy), parity, ethnicity and sex of the fetus [6,7]. Furthermore, it is important that growth and birth weight standards are free of pathology, such as smoking and diabetes. The optimal weight at term is combined with a 'proportionality growth curve', which is derived from an in utero fetal growth formula [8]. When a fetal rather than a neonatal weight-based curve is used, the negative skewedness of birth weight curves in the preterm period is avoided. The skewed distribution exists because of the well-proven association between spontaneous preterm birth and fetal growth restriction [9].

3. Methods of assessing fetal growth

The clinical performance of screening methods of fetal growth restriction remains poor [2]. Screening policies for detecting the small for gestational age (SGA) baby using clinical methods succeeds in only approximately a quarter of cases [10,11]. It is also questionable if with current methods, antenatal detection actually improves outcome [12]. A systematic review of randomised controlled trials suggests that, to date, most perinatal interventions do not show any significant effects on short-term perinatal outcome [13].

4. Palpation and fundal height measurements

Clinical palpation and fundal height measurements have a large range of error when predicting fetal weight, [14,15]. Westin et al. found that symphysis–fundus height measurements in low risk pregnancies were superior to maternal weight gain, maternal girth measurements, and biochemical analyses for the detection of the SGA infant [16]. A Cochrane review showed that there is too little evidence to show whether symphysis–fundal height measurement during pregnancy is more beneficial than abdominal palpation [17]. Mongelli et al. confirmed that symphysis–fundus height measurements are