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Estimation of Gestational age by Ultrasound and Extreme Prematurity

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ABSTRACT

Accurate estimation of the gestational age (GA) of the fetus is a key assessment made by providers of obstetric care during pregnancy, since decisions concerning management strategies are dependent on this estimate. Thus, the prognosis for preterm infants born at the border of viability is strongly dependent on the accuracy with which GA can be determined.

The aim of the present theses was to investigate the impact of maternal obesity, different procedures for dating and the different formulas employed in connection with ultrasonographic values on the estimation of gestational age. Furthermore, the incidence of and factors that influence the one-year survival of infants born extremely preterm were explored.

Our examination of the data from the EXPRESS study, which cover infants born prior to 27 weeks of gestation, revealed a one-year survival rate of 70%. The chance for survival without any major morbidity increased significantly with advancing gestational age at birth, from 9.8% at 22 weeks to 85% at 26 weeks of gestational age.

In accordance with current recommendations in Sweden, estimation of gestational age in 95% of the pregnancies included in the EXPRESS registry, was based on measurements of biparietal diameter and femur length by routine ultrasound examination usually performed during mid-trimester. However, the applications of different procedures and dating formulas in other countries make comparisons of rates of neonatal mortality and morbidity both difficult and unreliable. Therefore, we examined estimation of GA based on the last menstrual period (LMP) in this same cohort. The predicted duration of pregnancy based on LMP was in general longer than when assessed by ultrasound, but the rates of survival and morbidity were the same with both approaches. Moreover, we found that despite the fact that the dating formulae developed by Hadlock, Persson and Mul and coworkers are all based on ultrasonographic measurements of biparietal diameter (BPD) and femur length (FL), the estimates of the gestational age that they provide for infants later born extremely preterm differed significantly.

Fetuses which are found upon ultrasound examination to be at least 7 days smaller than expected on the basis of the LMP, exhibit an elevated risk for being born small for gestational age (SGA) as well as for stillbirth. In our extensive cohort study based on the Medical Birth Registry, the risk for such a discrepancy was found to be enhanced among obese mothers, increasing linearly with increasing maternal BMI. In this case, all of the dating formulae based on BPD and FL produced similar prediction of SGA.

In conclusion, the procedure employed, the choice of ultrasonographic formula applied, and maternal obesity, all influence assessment of gestational age. These findings should be taken into consideration in managing pregnancies that result in preterm infants born on the edge of viability.

Key words: pregnancy, preterm birth, ultrasound, gestational age, obesity, neonatal outcome, pregnancy dating, LMP

