ACCURACY OF ULTRASOUND ESTIMATION OF FETAL WEIGHT AT TERM

Andre Francis, Ann Tonks, Jason Gardosi
West Midlands Perinatal Institute

BACKGROUND

The ability to undertake accurate assessment of fetal growth by serial estimation of fetal weight is an essential component of maternity care.

However an increasing number of ultrasound departments, often under substantial workload pressures, have stopped scanning for 'growth' at term, claiming that ultrasound biometry is not accurate in late pregnancy.

We wanted to test this claim by comparing the results of scan estimated fetal weight (EFW) with the baby's subsequent weight at birth, for preterm and term gestations.

METHODS

The data were derived from a regional database of routinely collected information from 19 regional maternity units, and included dates and measurements of ultrasound scans and the date and weight of the baby at birth.

We analysed a total of 2296 pregnancies where an ultrasound scan was performed within 3 days of delivery, including 606 preterm (<37 weeks) and 1690 term deliveries.

EFW was calculated by the Hadlock formula programmed into the units' scanners. The assumed weight gain during the 1, 2 or 3 day delay between scan measurement and birth was adjusted for by the previously described 'proportionality formula' [1].

RESULTS

The overall systematic (mean) error was +58g, with a random error (standard deviation) of 293g.

Gestational age at scan	Proportion of scan error and CI, within +/-10%	+/-15%	+/-20%
24-28 weeks (N=11)	81.8% (52.3-94.9)	100% (74.1-100)	100% (74.1-100)
28-31 weeks (N=54)	74.1% (61.1-83.9)	88.9% (77.8-94.8)	90.7% (80.1-96.0)
31-34 weeks (N=134)	68.7% (60.4-75.9)	83.6% (76.4-88.9)	89.6% (83.2-93.7)
34-37 weeks (N=472)	68.9% (64.5-72.9)	86.2% (82.8-89.0)	93.0% (90.3-95.0)
<37 weeks (N=671)	69.6% (65.9-72.8)	85.6% (83.3-88.5)	91.9% (90.0-94.0)
≥37 weeks (N=1625)	72.8% (70.8-75.1)	89.6% (88.2-91.2)	95.9% (94.9-96.8)

The proportion of cases and confidence intervals (CI) were calculated, where the measured EFW was within 10%, 15% or 20% of the birthweight adjusted to the gestational age at the time of the EFW measurement.

Accuracy was best at early preterm gestations, although numbers were lower and confidence intervals were wide.

EFWs at term were as good, and in fact marginally *better* than scans done in the preterm period, with 73% of EFWs falling within a +/- 10% margin of error.

Birthweight	Proportion of scan error and CI, within +/-10%	+/-15%	+/-20%
<1500g (N=111)	66.7% (57.5-74.7)	82.9% (74.8-88.8)	88.3% (81.0-93.0)
1500-2500g (N=635)	71.5% (67.9-74.9)	88.0% (85.3-90.3)	93.9% (91.7-95.5)
<2500-4000g (N=1464)	72.9% (70.5-75.1)	89.7% (88.0-91.1)	95.8% (94.7-96.7)
≥4000g (N=86)	66.3% (55.8-75.4)	84.9% (75.8-90.9)	94.2% (87.1-97.5)

Analysis by birthweight showed that the error was larger at the extremes, i.e. for babies <1500g and ≥ 4000g

Maternal BMI	Proportion of scan error and CI, within +/-10%	+/-15%	+/-20%
<20 (N=305)	75.4% (70.3-79.9)	88.5% (84.5-91.6)	95.7% (92.8-97.5)
20-35 (N=1763)	72.5% (70.4-74.5)	89.6% (88.1-91.0)	95.1% (94.0-96.0)
≥ 35 (N=192)	62.0% (54.9-68.5)	80.7% (74.6-85.7)	91.1% (86.3-94.4)

Scan error was smallest in thin mothers and largest in obese mothers. However even in mothers with a BMI ≥ 35, over 80% of EFWs were within +/- 15%,

CONCLUSIONS

- Ultrasound biometry is overall a quite accurate means for the estimation of fetal weight in routine practice.
- There is no evidence that scan accuracy is any worse at term gestations; it is at least as good and, if anything, even better at term.
- Adequate ultrasound resources are essential to help detect fetuses at risk due to fetal growth restriction, as they require further investigations and/or consideration for timely delivery.

Reference

1 Gardosi J, Mongelli M, Wilcox M, Chang A. An adjustable fetal weight standard. *Ultrasound Obstet Gynecol.* 1995; 6(3):168-74.