Survival of pregnancies with small for gestational age detected before 24 weeks gestation

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A B S T R A C T

Objective: Counselling women where severe growth abnormalities are detected early in the pregnancy is often difficult due to a paucity of outcome data of this specific subset of early onset disease. This study therefore aimed to assess the outcome of pregnancies where an estimated fetal weight less than the third centile were detected prior to 24 weeks gestation.
Study design: A retrospective study in two London teaching hospitals, over an eight year period was performed, analysing all pregnancies with an ultrasound estimated fetal weight less than the third centile prior to 24 weeks gestation. Outcome data: intrauterine death, neonatal death, survival to discharge, gestation at delivery and birthweight were collected.
Results: Out of 20 pregnancies included in the analysis, six died in utero, two died in the neonatal period and 12 (60%) survived until discharge. Of the livebirths, 67% delivered preterm and 100% percent of livebirths were delivered by Caesarean Section.
Conclusion: When severe growth abnormalities were detected before 24 weeks, more than half of pregnancies resulted in survival to neonatal discharge. There was an increased incidence of preterm delivery, caesarean section and neonatal unit admission. This information is useful in counselling parents.

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Introduction

Fetal growth restriction (FGR) is a common obstetric condition complicating up to 10% of all pregnancies. Growth restricted fetuses have been shown to be at an increased risk of perinatal morbidity and mortality: it has been reported that such fetuses are at a 15-fold increased risk of intrauterine death [1].

Difficulties arise in counselling women with regards to the expected prognosis of pregnancies complicated by discrepancies in fetal growth due to a number of factors including: lack of uniformity in the definition of fetal growth restriction in the literature, variations in the timing of onset of the disease and uncertainty regarding exact disease progression.

The American College of Obstetricans and Gynaecologists (ACOG) defines Fetal Growth Restriction, as an estimated fetal weight less than the tenth centile [2]. This, however, is purely statistical and will encompass some fetuses that are simply constitutionally small. Some groups have attempted to refine this definition further by using a cut off of the third centile [3] in an attempt to detect pregnancies more likely to be associated with adverse outcomes. However, true growth restriction is often associated with evidence of placental insufficiency and its progression is often sequential: a decrease in the cerebroplacental Doppler ratio, abnormalities in umbilical artery Doppler indices followed by abnormalities in the venous system [4].

It is also becoming increasingly apparent that early and late onset fetal growth restriction is likely to have disparate pathophysiologies [4]. Placental changes in pregnancies complicated by growth restriction are different depending on gestation at onset [5]. In early onset growth restriction (prior to 34 weeks gestation), prolongation of the pregnancy is a primary goal, as premature delivery compounded with the effects of growth restriction results in lower expected survival rates [6]. The majority of cases of early onset FGR often show significant uterine

artery Doppler abnormalities indicating placental dysfunction and its severity [4].

However, a number of fetuses (with a certain estimated date of delivery from 1st trimester assessment) are identified at the anomaly scan prior to 24 weeks as having an EFW less than the 3rd centile. Information regarding outcomes of fetuses that have been identified as small for gestational age (SGA) at this scan is currently limited. Both parents and clinicians are faced with the dilemmas in prediction of outcome and management, particularly due to restrictions in terminating pregnancies after 24 weeks in the United Kingdom [7]. This study therefore aims to assess the perinatal outcome when fetuses are identified as having an estimated fetal weight (EFW) on or less than the third centile prior to 24 weeks gestation, where congenital infections and karyotype abnormalities have been excluded.

Materials and methods

A retrospective study was undertaken, identifying all women with singleton pregnancies and antenatal scans prior to 24 weeks demonstrating an EFW less than the third centile, between 2003 and 2011 in the fetal medicine units of two London teaching hospitals: St Thomas's Hospital and Queen Charlotte's and Chelsea Hospital. Cases were identified from the database application Astraia (Astraia software gmbh, Munich). Gestational age was based on first trimester ultrasound determination of the estimated date of delivery and fetal weight was calculated in accordance with the Hadlock formula based on abdominal circumference, head circumference and femur length [8].

Maternal demographics were obtained including: maternal age, parity, body mass index (BMI), ethnicity, smoking status and the presence of risk factors such as existing hypertensive disorders. Delivery parameters were also recorded including: pregnancy outcome (i.e. intrauterine death, livebirth, neonatal death) gestation at delivery, mode of delivery, birthweight, admission to the neonatal intensive care unit and neonatal complications.

Antenatal ultrasound findings for fetal wellbeing were collected including umbilical artery Doppler results, venous Doppler parameters (including assessment of the umbilical vein for pulsatations and the ductus venosus for abnormalities in the a-wave), amniotic fluid index (AFI) and EFW. Data for maternal uterine artery Doppler velocimetry taken between 20 and 24 weeks was also recorded when performed.

Antenatal investigations and results were also identified including chromosomal analysis and congenital infection testing. Postnatal karyotype results were also recorded.

Cases were excluded if there was no dating scan or Doppler results were not available. Cases with chromosomal abnormalities, identified either by amniocentesis or confirmed postnatally, and fetuses with congenital abnormalities were also excluded from the analysis.

Statistical analysis was performed using the SPSS software package version 17 (SPSS Chicago, IL, USA). ANOVA was used to compare the effect of gestation at delivery and birthweight on outcome.

Results

Fifty-five singleton pregnancies were identified: eight were excluded due to structural abnormalities, two due to karyotype abnormalities (both trisomy 18), one due to congenital cytomegalovirus infection, 18 due to the fact that dating was not undertaken by a first trimester scan, five as Doppler studies had not been performed and one as full follow-up data was not available. This left 20 cases suitable for analysis. Maternal demographics can be seen in Table 1.

Antenatal ultrasound findings can be seen in Table 2. Of the 20 cases, five had antenatal karyotyping undertaken (all of which were normal). The other 15 cases had no other specific features of

aneuploidy apart from FGR. No karyotype abnormalities were reported postnatally. A screen for congenital infections such as toxoplasmosis, Cytomegalovirus (CMV) and parvovirus was performed in seven cases, all of which were normal (one case was detected postnatally and this was excluded from the analysis).

Six intrauterine deaths were recorded. 14 pregnancies ended in a livebirth: two of these babies died in the neonatal period. Seven women developed pre-eclampsia. Table 3 shows the outcome data.

Of the seven fetuses that had normal Doppler velocimetry at the last ultrasound scan, three were intrauterine deaths and four were livebirths that survived to discharge. The median gestation at delivery of the liveborn was 38^{+4} (range 37^{+6} to 39^{+0}) weeks with a median birthweight of 2187 g (range 1880–2250 g).

Of the livebirths, the indication for delivery was on a case by case basis including: gestation, Doppler velocimetry changes and

Table 1
Maternal demographics.

Parameter	
Maternal age (years)	Median 33
	Range 26–43
Ethnicity	European 5 (25%)
	African 4 (20%)
	Afro-Caribbean 10 (50%)
	Middle Eastern 1 (5%)
Smoking status	Non smoker $n = 20$ (100%)
Previous medical history	None $n = 8$ (40%)
	Hypertension $n = 4$ (20%)
	VTE $n = 1$ (5%)
	Factor V Leiden mutation $n = 1$ (5%)
	Hepatic cirrhosis $n = 1$ (5%)
	Asthma $n = 3$ (15%)
	Hyperthyroidism $n = 1$ (5%)
	SLE $n = 1$ (5%)
Parity	0 $n = 10$ (50%)
	1 $n = 7$ (35%)
	2 $n = 1$ (5%)
	3 $n = 1$ (5%)
	4 $n = 1$ (5%)
Previous obstetric history ($n = 10$)	Vaginal delivery at term $n = 3$ (20%)
	C-section at term $n = 2$ (13%)
	C-section preterm $n = 1$ (7%)
	Intrauterine death $n = 3$ (20%)
	Previous C-section, preterm delivery and intrauterine death $n = 1$ (7%)

Table 2
Antenatal ultrasound findings.

Parameter	
Gestation of scan	
Median	21^{+4}
Range	18^{+2} to 24^{+0}
Centile at diagnosis of small for gestational age	0.4
Median	0.2–1.25
Interquartile range	
Uterine artery Doppler at 20–24 week scan	No notch $n = 8$ (40%)
	Unilateral $n = 3$ (15%)
	Bilateral $n = 9$ (45%)
Gestation at final ultrasound scan during pregnancy (weeks)	28^{+3}
Median	24^{+6} to 32^{+0}
Interquartile range	
Umbilical artery Doppler at final ultrasound scan during pregnancy	Normal $n = 7$ (35%)
	Raised pulsatility index $n = 1$ (5%)
	Absent end diastolic flow $n = 7$ (35%)
	Reversed end diastolic flow $n = 3$ (15%)
	Reversed end diastolic flow and venous changes $n = 2$ (10%)
Amniotic fluid at final ultrasound scan during pregnancy	Normal $n = 17$ (85%)
	Oligohydramnios $n = 2$ (10%)
	Polyhydramnios $n = 1$ (5%)