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Chapter 11

Suspected versus non-suspected small-for-gestational age fetuses at term: perinatal outcomes

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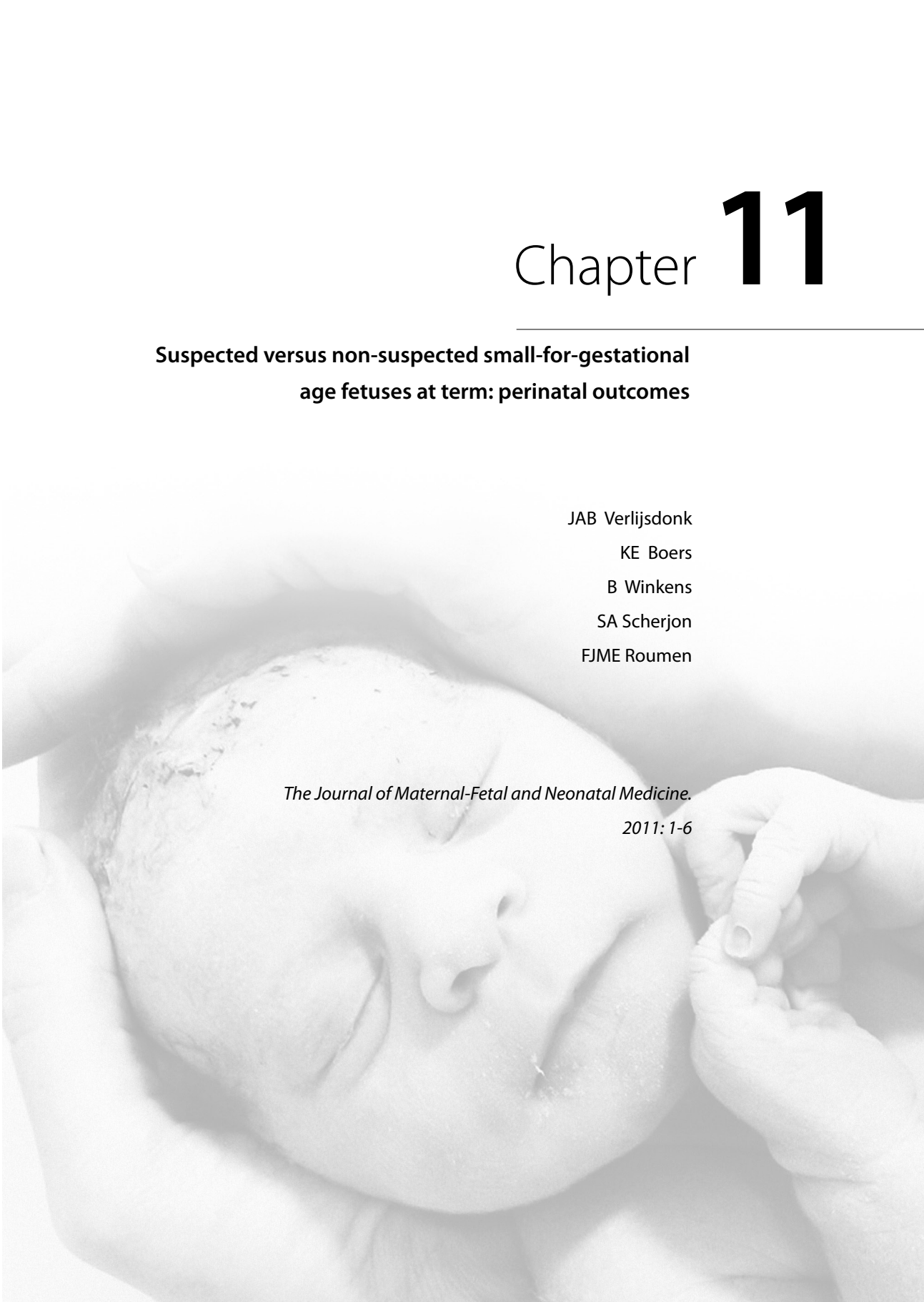
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Abstract

Objective: To compare perinatal outcomes of suspected versus non-suspected small-for-gestational age fetuses (SGA) at term.

Methods: Retrospective cohort study among all term singleton neonates with a birth weight <10th percentile born in the Parkstad region between 01-01-2006 and 03-31-2008. The subjects were assigned to a prenatally Suspected or Non-Suspected SGA group. Primary outcome was adverse neonatal outcome at birth, defined as a composite of intrauterine fetal death, Apgar <7 at 5 minutes, or pH umbilical artery <7.05. Secondary outcome included neonatal medium care unit (NMCU) admission ≥ 7 days.

Results: 430 subjects were included in the study; 36.7% was suspected of SGA. In the Suspected SGA group mean gestational age at birth and birth weight were significantly lower, whereas maternal morbidity was significantly higher. The incidence of labor induction and elective cesarean section were also significantly higher in the Suspected SGA group. Total perinatal mortality was 2.1%. Identification of SGA and subsequent management led to a significant decrease of adverse neonatal outcome at birth, but did not lead to a significant decrease in NMCU admission >7 days.

Conclusions: Suspicion of SGA was associated with a more active management of labor and delivery, resulting in a better neonatal outcome at birth.

Introduction

Perinatal mortality in the Netherlands has gradually decreased from 10.9 per thousand births in 1999, to 10.0 in 2004, and to 9.7 in 2007. This decreasing trend, however, is slower than in other European countries, resulting in a public and political debate on the organisation of obstetric care in the Netherlands¹. A major contributing factor to perinatal mortality is the small-for-gestational age (SGA) fetus²⁻⁴. Between 2000 and 2009, perinatal mortality rate in the Netherlands in SGA pregnancies was 1.79%⁵. SGA is also associated with an increased neonatal morbidity⁶⁻⁷. Effects of SGA persist well beyond the neonatal period. Children with a history of SGA lag behind in somatic growth, neurodevelopmental performance, cognition and school achievements⁸. SGA is associated with an increased late life prevalence of cardiovascular disease⁹.

Improving the prognosis of the SGA fetus by providing effective clinical management is a great obstetrical challenge. In case SGA is suspected based on fundal height measurement, the diagnosis can be confirmed by ultrasound. Identifying SGA in low risk pregnancies is difficult¹⁰⁻¹³. The detection rate after abdominal palpation as a screening test by first line midwives subsequently confirmed by ultrasound, was 15% in a Dutch trial among 6318 singleton pregnancies¹⁴. In a clinical setting in Sweden, 63% of all SGA fetuses were identified prenatally¹⁵.

There are no effective therapies to improve the growth pattern of the growth restricted fetus¹⁶. Monitoring the SGA fetus by ultrasound, Doppler and cardiotocography may enable the treating physician to modulate the intensity of the controls and to precisely define the timing of delivery, when necessary¹⁷⁻¹⁸. When optimal maternal and fetal monitoring can be provided, expectant management and labor induction have equivalent fetal and maternal outcomes¹⁹.

The aim of this retrospective cohort study was to analyze the effect of suspicion and subsequent management of SGA at term in common daily practice on perinatal outcomes, in a well-defined region in the Netherlands.

Methods

The study population consisted of all term (370 - 420 weeks' gestation) singleton SGA neonates born between January 1, 2006 and March 31, 2008, in the Parkstad Heerlen region. Most babies were delivered in the Atrium Medical Centre Parkstad under supervision of an obstetrician, others were delivered at home or in the hospital under supervision of a midwife of the Obstetrical Cooperate Association Heerlen.

Selection of the patients was based on the information available in their medical records. Eligible patients were assigned to a group with prenatally Suspected SGA or a group with prenatally Non-Suspected SGA. SGA was defined as a birth weight <10th percentile, based on weight curves provided by the Netherlands Perinatal Registration. SGA was considered suspected when this was described unambiguously in the mothers' pregnancy chart. The clinical surveillance protocol used in case of prenatally suspected SGA comprised of fetal ultrasounds with fetal-placental Doppler velocimetry weekly, and cardiotocography twice weekly or more frequently depending on the severity of the growth restriction.

Baseline characteristics of the mother and the neonate, characteristics of pregnancy, labor and delivery, and perinatal outcomes were abstracted from the medical files. Maternal baseline characteristics included age at delivery, height, BMI, smoking, use of drugs, alcohol or fetotoxic medication (e.g. SSRI's, antiepileptic drugs), parity, and hypertensive disorders during pregnancy. Neonatal baseline characteristics included gestational age at birth, birth weight and sex. Variables concerning pregnancy, labor and delivery included the moment of referral to the obstetrician, initiation of labor, analgesia, mode of delivery, and delivery complications.

The primary outcome was the composite "adverse neonatal outcome at birth" defined as intrauterine death, Apgar <7 at 5 minutes, or pH umbilical artery <7.05. Secondary outcomes included resuscitation, congenital anomalies, neonatal complications (ranging from hypoglycemia to infections to encephalopathy) and neo-

natal medium care unit (NMCU) admission ≥ 7 days. A NMCU is equipped for neonates born after at least 32 weeks' gestation who may need artificial ventilation for a maximum of 24 hours.

Categorical variables are presented by number and percentage. Continuous variables are presented by mean and standard deviation. The Chi-square or Fisher's exact test was performed for categorical variables, and the independent-samples t-test for continuous variables. Logistic regression was used to determine the effect of suspicion of IUGR on adverse neonatal outcome at birth as well as NMCU admission ≥ 7 days after correction for the clinically and statistically most important maternal and neonatal variables, where the maximum number of variables is restricted by the total number of events. Variables with more than 5.0% missing data were not included in the logistic regression analysis, where the robustness of the results was tested by comparing them with those obtained after adding these variables to the model. The effect of suspicion of SGA and other variables on adverse neonatal outcome at birth and NMCU admission ≥ 7 days were presented by the odds ratio with corresponding 95% confidence interval. Linearity assumption was checked by adding and testing a centered quadratic term, leaving this term in the model when significant.

Results were considered statistically significant when the p-value was < 0.05 . Statistical analysis was performed using the SPSS program (version 17.0).

Results

Between January 1, 2006 and March 31, 2008, 4247 women were delivered of a term singleton neonate in the Parkstad region⁵. From these neonates, 430 (10.1%) had a birth weight < 10 th percentile and were enrolled in the study. 158 (36.7%) of these SGA neonates were suspected prenatally and assigned to the Suspected SGA group. The remaining 272 (63.3%) neonates were assigned to the Non-Suspected SGA group.

In home deliveries (n=40), not all variables used in this study were consequently documented. For the total cohort, this resulted in missing data in the variables maternal length (6.5%), maternal BMI (19.8%), placenta weight (8.1%), umbilical artery pH (9.1%) and umbilical vein pH (10.9%). Of all other variables less than 0.1% of the data was missing.

Maternal baseline characteristics are shown in Table 1. Compared to the Non-Suspected SGA group, mothers in the Suspected SGA group were significantly taller and had a significantly lower BMI. Significantly more women in this group were smokers, used drugs, had an SGA in a previous pregnancy, and had hypertensive disorders during pregnancy.

Table 1
Maternal baseline characteristics

	Suspected SGA group (n=158)	Non-Suspected SGA group(n=272)	p-value
Age at delivery (years) (mean, SD)	28.4 (5.8)	29.4 (5.4)	0.069
Height (m) (mean, SD)	1.66 (0.07)	1.65 (0.07)	0.021
BMI (kg/m²) (mean, SD)	27.0 (5.2)	28.8 (4.6)	0.001
Smoking (n)	100 (63.3%)	107 (39.5%)	<0.001
Drugs (n)	23 (14.6%)	11 (4.1%)	<0.001
Alcohol (n)	9 (5.7%)	10 (3.7%)	0.330
Fetotoxic medication (n)	9 (5.7%)	13 (4.8%)	0.684
Multigravida (n)	85 (53.8%)	163 (59.9%)	0.215
IUFD* previous pregnancy (≥24 weeks) (n)	3 (3.5%)	4 (2.5%)	0.694
SGA previous pregnancy (n)	44 (51.8%)	56 (34.4%)	0.008
Hypertensive disorders (n)	23 (14.6%)	21 (7.7%)	0.024
Proteinuria (n)	17 (10.8%)	18 (6.6%)	0.130

* Intrauterine Fetal Death

Table 2 shows the neonatal baseline characteristics. Mean gestational age and birth weight were significantly lower for neonates in the Suspected SGA group

compared to the Non-Suspected SGA group. Significantly more neonates had a birth weight < p2.3 in the Suspected SGA group.

Table 2
Neonatal Baseline Characteristics

	Suspected SGA group (n=158)	Non-Suspected SGA group(n=272)	p-value
Gestational age at birth (days) (mean, SD)	275.1 (9.1)	280.2 (7.8)	<0.001
Birth weight (g) (mean, SD)	2518.1 (331.7)	2770.7 (270.7)	<0.001
Birth weight			<0.001
<p2.3 (n)	68 (43.0%)	66 (24.3%)	
>p2.3 - <p5 (n)	39 (24.7%)	73 (26.8%)	
>p5 - <p10 (n)	51 (32.3%)	133 (48.9%)	
Male sex (n)	74 (46.8%)	142 (52.2%)	0.283

As shown in Table III, 94.9% of women in the Suspected SGA group had prenatal care by an obstetrician, in contrast to 53.7% of women in the Non-Suspected SGA group. In the Suspected SGA group, induction of labor and elective cesarean section were more frequently performed, whereas instrumental delivery and secondary cesareans were more common in the Non-Suspected SGA group. The incidence of meconium stained amniotic fluid was significantly lower in the Suspected SGA group compared to the Non-Suspected SGA group, as were the incidence of episiotomy or a 2nd, 3rd or 4th degree rupture, the mean amount of blood loss, the incidence of blood transfusions, and the mean placental weight.

Table 3
Characteristics of pregnancy, labor and delivery

	Suspected SGA group (n=158)	Non-Suspected SGA group(n=272)	p-value
Moment of referral to obstetrician			<0.001
Primary pregnancy attendance by obstetrician (n)	64 (40.5%)	84 (30.9%)	
Referred to obstetrician during pregnancy (n)	86 (54.4%)	62 (22.8%)	
Referred to obstetrician during delivery (n)	8 (5.1%)	86 (31.6%)	
Referred to obstetrician post partum (n)	0 (0.0%)	40 (14.7%)	
Initiation of labor			<0.001
Spontaneous (n)	101 (63.9%)	225 (82.7%)	
Induction (n)	37 (23.4%)	33 (12.1%)	
Elective cesarean section (n)	20 (12.7%)	14 (5.1%)	
PROM* (n)	11 (8.3%)	30 (11.8%)	0.298
Augmentation* (n)	37 (27.0%)	76 (29.3%)	0.624
Analgesia			0.302
No analgesia (n)	73 (46.2%)	139 (51.1%)	
Oral / systemic analgesia (n)	45 (28.5%)	72 (26.5%)	
Epidural analgesia (n)	9 (5.7%)	23 (8.5%)	
Spinal / General analgesia(n)	31 (19.6%)	38 (14.0%)	
Mode of delivery			0.034
Spontaneous (n)	113 (71.5%)	201 (73.9%)	
Instrumental (n)	13 (8.2%)	28 (10.3%)	
Elective cesarean section (n)	20 (12.7%)	14 (5.1%)	
Secondary cesarean section (n)	12 (7.6%)	29 (10.7%)	
Meconium stained amniotic fluid (n)**	36 (22.8%)	92 (33.8%)	0.016
Mean length of 2nd stage of labor (min) (mean, sd)***	17.9 (18.8)	22.4 (22.5)	0.056
Episiotomy or 2nd/3rd/4th degree rupture (n)***	70 (55.6%)	154 (67.2%)	0.029
Mean blood loss (ml) (mean, sd)	362.5 (262.6)	440.9 (371.0)	0.011
Blood transfusion (n)	1 (0.6%)	14 (5.1%)	0.014
Mean weight placenta (g) (mean, sd)	475.4 (93.8)	522.5 (97.7)	<0.001

*** All except elective cesarean section

*** All except intrauterine deaths

*** All except cesarean section

Table 4 presents the perinatal results. In the Suspected SGA group the incidence of adverse neonatal outcome at birth was lower compared to the Non-Suspected SGA group (3.8% vs. 9.0%, $p=0.056$). Nine children died, resulting in a total perinatal mortality of 2.1%. In the Suspected SGA group, 2 children died during labor. In one case a dying fetal heart rate tracing was recorded in the outpatient department, and the fetus died before an emergency cesarean section could be performed. In the other case, the pregnant woman was seen early in labor with few fetal movements, but was sent back home as the fetal heart rate tracing was mistakenly judged reassuring. Several hours later she presented with an intrauterine fetal death.

In the Non-Suspected SGA group, six women had an intrauterine fetal death; three were caused by placental insufficiency, and one by a partial placental abruption, whereas in two women only positive neonatal and placental cultures were diag-

Table 4

Perinatal results

	Suspected SGA group (n=158)	Non-Suspected SGA group(n=272)	p-value
Composite adverse neonatal outcome at birth	6 (3.8%)	21 (9.0%)	0.056
Perinatal mortality total (n)	2 (1.3%)	7 (2.6%)	0.496
During pregnancy (n)	0	6 (2.2%)	
During labor (n)	2 (1.3%)	0	
After delivery (n)	0	1 (0.4%)	
Live birth (n)	156 (98.7%)	266 (97.8%)	0.716
Apgar 1' <7(n)	11 (7.1%)	32 (12.0%)	0.103
Apgar 5' <7 (n)	3 (1.9%)	9 (3.4%)	0.548
pH umbilical artery <7.05 mol/L (n)	1 (0.6%)	9 (3.9%)	0.054
pH umbilical vein <7.05 mol/L (n)	0 (0.0%)	4 (1.8%)	0.151
Resuscitation (n)	16 (10.3%)	34 (12.8%)	0.438
Consultation pediatrician (n)	152 (96.2%)	237 (87.1%)	0.002
Admission NMCU (n)	90 (57.7%)	98 (36.8%)	<0.001
Congenital anomalies (n)	11 (7.0%)	15 (5.5%)	0.550
Admission NMCU >7 days (n)*	55 (35.3%)	37 (13.9%)	<0.001
Neonatal complications total (n)	87 (55.8%)	112 (42.3%)	0.007

* All except the neonate that died after delivery

nosed without clinical signs of an intrauterine infection. Furthermore, in the Non-Suspected SGA group one neonate died 3 days after emergency cesarean section for fetal distress. In this case it was decided to stop treatment because of irreversible cerebral damage.

In the Suspected SGA group significantly more neonates needed consultation of a pediatrician, were admitted to the NMCU, stayed there >7 days, and had common complications like hypothermia, hypoglycemia, hyperbilirubinemia, respiratory distress, and infections.

Table 5 shows that the crude odds ratio adverse neonatal outcome at birth when comparing Suspected with Non-Suspected SGA at term, was 0.40 ([95% CI 0.16-1.02]; $p=0.056$). After correction for birth weight and hypertensive disorders, it was found that identification and subsequent labor and delivery management led to a significant decrease of adverse neonatal outcome at birth (OR 0.28 [95% 0.10-0.79]; $p=0.016$).

Table 5

Multivariable logistic regression on adverse neonatal outcome at birth

	Odds Ratio (95% CI)	p-value	Corrected Odds Ratio (95% CI)	Corrected p-value
Suspected SGA	0.40 (0.16-1.02)	0.056	0.28 (0.10-0.79)	0.016
Birth weight	1.00 (0.99-1.00)	0.538	0.99 (0.99-1.00)	0.171
Maternal hypertensive disorders	2.45 (0.93-6.45)	0.069	2.56 (0.94-6.98)	0.067

* All except the neonate that died after delivery

Table 6 shows that the crude odds ratio for NMCU admission ≥ 7 days when comparing suspected with non-suspected SGA at term, was 3.37 ([95% CI 2.09-5.44]; $p<0.001$). After correction for gestational age at birth, birth weight, maternal smoking, drug abuse and hypertensive disorders, it was found that suspicion and subsequent labor and delivery management did not lead to a significant decrease in NMCU admission ≥ 7 days (OR 1.02 [95% CI 0.53-1.97]; $p=0.950$). Similar results were obtained when the variables with >5.0% missing data were added to the model.

Lower birth weight and maternal hypertensive disorders were independently associated with NMCU admission ≥ 7 days. For babies with a birth weight < 2.3 , only birth weight and not maternal hypertensive disorders was independently associated with NMCU admission ≥ 7 days (data not shown).

Table 6
Multivariable logistic regression on NMCU admission > 7 days

	Odds Ratio (95% CI)	p-value	Corrected Odds Ratio (95% CI)	Corrected p-value
Suspected SGA	3.37 (2.09-5.44)	< 0.001	1.02 (0.53-1.97)	0.950
Gestational age at birth	0.91 (0.88-0.94)	< 0.001	1.03 (0.99-1.08)	0.138
Birth weight	0.99 (0.99-1.00)	< 0.001	0.99 (0.99-1.00)	< 0.001
Maternal smoking	1.33 (0.84-2.12)	0.226	0.82 (0.43-1.55)	0.533
Maternal drug abuse	3.70 (1.80-7.59)	< 0.001	2.39 (0.89-6.37)	0.083
Maternal hypertensive disorders	3.71 (1.93-7.12)	< 0.001	3.22 (1.30-8.01)	0.012

Between January 1, 2006 and March 31, 2008, 4247 women were delivered of a term singleton neonate in the Parkstad region⁵ From these neonates, 430 (10.1%) had a birth weight < 10 th percentile and were enrolled in the study. 158 (36.7%) of these SGA neonates were suspected prenatally and assigned to the Suspected SGA group. The remaining 272 (63.3%) neonates were assigned to the Non-Suspected SGA group.

In home deliveries ($n=40$), not all variables used in this study were consequently documented. For the total cohort, this resulted in missing data in the variables maternal length (6.5%), maternal BMI (19.8%), placenta weight (8.1%), umbilical artery pH (9.1%) and umbilical vein pH (10.9%). Of all other variables less than 0.1% of the data was missing.

Maternal baseline characteristics are shown in Table 1. Compared to the Non-Suspected SGA group, mothers in the Suspected SGA group were significantly taller and had a significantly lower BMI. Significantly more women in this group were smokers, used drugs, had an SGA in a previous pregnancy, and had hypertensive disorders during pregnancy.

Table 2 shows the neonatal baseline characteristics. Mean gestational age and birth weight were significantly lower for neonates in the Suspected SGA group compared to the Non-Suspected SGA group. Significantly more neonates had a birth weight < p2.3 in the Suspected SGA group.

As shown in Table 3, 94.9% of women in the Suspected SGA group had prenatal care by an obstetrician, in contrast to 53.7% of women in the Non-Suspected SGA group. In the Suspected SGA group, induction of labor and elective cesarean section were more frequently performed, whereas instrumental delivery and secondary cesareans were more common in the Non-Suspected SGA group. The incidence of meconium stained amniotic fluid was significantly lower in the Suspected SGA group compared to the Non-Suspected SGA group, as were the incidence of episiotomy or a 2nd, 3rd or 4th degree rupture, the mean amount of blood loss, the incidence of blood transfusions, and the mean placental weight.

Table 4 presents the perinatal results. In the Suspected SGA group the incidence of adverse neonatal outcome at birth was lower compared to the Non-Suspected SGA group (3.8% vs. 9.0%, $p= 0.056$). Nine children died, resulting in a total perinatal mortality of 2.1%. In the Suspected SGA group, 2 children died during labor. In one case a dying fetal heart rate tracing was recorded in the outpatient department, and the fetus died before an emergency cesarean section could be performed. In the other case, the pregnant woman was seen early in labor with few fetal movements, but was sent back home as the fetal heart rate tracing was mistakenly judged reassuring. Several hours later she presented with an intrauterine fetal death. In the Non-Suspected SGA group, six women had an intrauterine fetal death; three were caused by placental insufficiency, and one by a partial placental abruption, whereas in two women only positive neonatal and placental cultures were diagnosed without clinical signs of an intrauterine infection. Furthermore, in the Non-Suspected SGA group one neonate died 3 days after emergency cesarean section for fetal distress. In this case it was decided to stop treatment because of irreversible cerebral damage.

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Table 5 shows that the crude odds ratio adverse neonatal outcome at birth when comparing Suspected with Non-Suspected SGA at term, was 0.40 ([95% CI 0.16-1.02]; $p=0.056$). After correction for birth weight and hypertensive disorders, it was found that identification and subsequent labor and delivery management led to a significant decrease of adverse neonatal outcome at birth (OR 0.28 [95% 0.10-0.79]; $p=0.016$).

Table 6 shows that the crude odds ratio for NMCU admission ≥ 7 days when comparing suspected with non-suspected SGA at term, was 3.37 ([95% CI 2.09-5.44]; $p<0.001$). After correction for gestational age at birth, birth weight, maternal smoking, drug abuse and hypertensive disorders, it was found that suspicion and subsequent labor and delivery management did not lead to a significant decrease in NMCU admission ≥ 7 days (OR 1.02 [95% CI 0.53-1.97]; $p=0.950$). Similar results were obtained when the variables with >5.0% missing data were added to the model. Lower birth weight and maternal hypertensive disorders were independently associated with NMCU admission ≥ 7 days. For babies with a birth weight < 2.3 , only birth weight and not maternal hypertensive disorders was independently associated with NMCU admission ≥ 7 days (data not shown).

Discussion

The incidence of SGA in the Parkstad region (10.1%) was similar to the incidence of SGA in the Netherlands (10.0%) based on the Netherlands Perinatal Registration curves⁵.

SGA was suspected in only 36.7% of cases, which is remarkably lower than the 63.0% found in a Swedish study¹⁵. A possible explanation for this low detection

rate is, that the Swedish study was a clinical setting, whereas our study included pregnancy attendance by primary care midwives at home as well. Estimating fetal weight is commonly performed only by abdominal fundal height measurement without a standardized protocol¹⁶. Ultrasound was only used when SGA was suspected and not as a routine procedure. The sensitivity of detecting SGA by measuring the fundal height is higher when the pregnant mother has a lower BMI, as was demonstrated in this study. The relatively lower birth weight in the Suspected SGA group, which can be derived from the higher incidence of a birth weight ≤ 2.3 percentile in this group, confirms that suspicion of SGA is also easier when the fetus is smaller. SGA was suspected more frequently in mothers who smoked, used drugs, had an SGA in a previous pregnancy, or had hypertensive disorders. This was presumably because obstetric care workers are more alert for SGA in these pregnancies¹⁹.

The high percentage of non-suspected cases of SGA in this and other studies¹⁰⁻¹⁵ is of great concern. It remains a diagnostic challenge to identify those fetuses at risk of true SGA. Optimization of diagnostic tools is urgently needed, as both abdominal fundal height measurement and routine ultrasonography are insufficient to estimate fetal weight below the 10th percentile correctly²⁰⁻²¹. In a German study, serial ultrasound measurements of fetal weight resulted in detection of only 30% of the SGA fetus¹¹. Customized growth centile charts are rarely applied in the Netherlands, but might identify the fetus at risk¹³⁻²².

Suspicion of SGA led to more active management. Gestational age at birth was significantly lower in the Suspected SGA group, which can be partly explained by the higher incidence of labor inductions and elective cesarean sections in this group. This is in accordance with other studies¹¹⁻²³⁻²⁴.

Logistic regression analysis showed, that suspicion of SGA followed by a more active management of labor and delivery resulted in better neonatal outcomes at birth. This is in contrast with other studies, which reported that these interventions are associated with higher rates of obstetrical complications and neonatal morbidity¹⁸⁻²⁵⁻²⁸. As suggested by a previous study active management is likely to be

advantageous for a genuine intrauterine growth restricted (IUGR) subpopulation that do not reach, because of inadequate placental function, their genetic growth potential. However, such a management might be detrimental for the constitutionally SGA fetuses who follow their own growth trajectory during pregnancy²⁹. Due to lack of data in this specific cohort, a reliable differentiation in to one of these groups (SGA or IUGR) is not feasible.

Perinatal mortality in this study was 2.1%, which is comparable with other studies²⁻⁵⁻³⁰. During the same period the incidence of perinatal mortality in term singleton pregnancies not complicated by SGA in the Parkstad region was significantly lower; 5 in 3817 babies (0.13%) (RR 15.67; [95% CI 5.28-46.6]; $p = <0.001$)⁵. This indisputably marks the importance of SGA as a risk factor for perinatal mortality. Whenever SGA at term is suspected, the pregnant women should be closely and continuously monitored as of the early stage of labor. In the recently published multicentre DIGITAT study in the Netherlands, in which 650 women with suspected IUGR at term were randomized to induction or expectant monitoring, no stillbirths or perinatal deaths occurred¹⁹. A possible explanation for this favorable outcome is that in the randomized controlled DIGITAT trial the pregnant women with suspected SGA may have been monitored more intensively than in regular daily practice. Suspicion of SGA and subsequent active management or intensive monitoring might have prevented the death of the fetus in at least the three cases of placental insufficiency in the Non-Suspected SGA group. However, even in the Suspected SGA group management of labor and delivery was not active enough to prevent the two cases of intrauterine fetal death. This pleads for more intensive monitoring and active management in pregnancies complicated by SGA at term.

In the Suspected SGA group, significantly more neonates were seen by a pediatrician, as this is routine policy in our O&G Department when SGA is suspected. Moreover, in this group significantly more neonates were admitted to the NMCU. The rate of NMCU admission ≥ 7 days was significantly higher in the Suspected SGA group. This can be explained by the significantly higher prevalence in the suspected SGA group of neonatal complications associated with low birth weight, ranging

from predominantly hypoglycemia to infections and incidentally encephalopathy. Identification and subsequent management of pregnancy, labor and delivery had no significant effect on the incidence of NMCU admission ≥ 7 days, whereas birth weight and maternal hypertensive disorders were independently associated with NMCU admission ≥ 7 days.

The main strength of this retrospective study is that it provides a better insight in common daily practice in a well-defined region in the south of the Netherlands without the bias of a study setting which is intrinsically to randomized controlled trials.

This study has some limitations. A limited amount of data was missing, as is common in retrospective studies. Midwives performing home deliveries are instructed to admit neonates with a birth weight < 10 th percentile to the pediatrician at the Atrium Medical Centre. It is possible, that a few healthy neonates with a good start were not referred to the obstetrician, leading to underreporting. In the Suspected SGA group, 39 women participated in the DIGITAT or HYPITAT trial¹⁹⁻³¹. From these patients, 15 underwent induction of labor as a result of randomization. So the number of inductions in this group might be overrepresented.

In conclusion, most cases of SGA were not suspected during pregnancy in this retrospective study. SGA was predominantly suspected in women who were carrying a very small fetus, had a lower BMI, who smoked, used drugs, had a previous SGA, or had hypertensive disorders. Suspicion of SGA led to a more active management of labor and delivery. This resulted in better neonatal outcomes at birth, but was not active enough to prevent two cases of fetal death in the Suspected SGA group. Identification of SGA and a more active management also had no significant influence on the incidence of NMCU admission ≥ 7 days, which was associated with the lower birth weight of the neonates and the higher prevalence of maternal hypertensive disorders in this group.

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