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Original article

Maternal and fetal risk factors affecting perinatal mortality in early and late fetal growth restriction

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ABSTRACT

Objective: To determine the factors which affect the perinatal deaths in early and late fetal growth restriction (FGR) fetuses using threshold of estimated fetal weight (EFW) < 5th percentile.
Materials and Methods: This retrospective study included singleton 271 FGR fetuses, defined as an EFW < 5th percentile. All fetuses considered as growth restrictions were confirmed by birth weight. Fetuses with multiple pregnancy, congenital malformation, chromosomal abnormality, and premature rupture of membrane were excluded. Samples were grouped in early and late FGR. Early FGR fetuses was classified as gestational age at birth ≤ 34 weeks and late FGR was classified as gestational age at birth > 34 weeks. Factors which affect the perinatal deaths were analyzed descriptively in early and late FGR. The perinatal mortality was calculated by adding the number of stillbirths and neonatal deaths.
Results: The study included 86 early and 185 late FGR fetuses, 31 resulted in perinatal deaths, 28 perinatal deaths were in early FGR, and three perinatal deaths were in late FGR. Perinatal deaths occurred more commonly in early FGR fetuses with an EFW < 3rd percentile. Prior stillbirth, preeclampsia, the degree of increasing vascular impedance of umbilical artery(UA) and uterine artery (UtA) showed significant correlation with perinatal death in early FGR. All three perinatal deaths in late FGR occurred in fetuses with EFW < 3rd percentile and severe oligohydramnios. Also, placental abruption and perinatal death was found significantly higher in increased vascular impedance of UtAs whatever the umbilical artery Doppler.
Conclusion: Only EFW < 3rd percentile and severe olgohydramnios seem to be contributing factors affecting perinatal death in late FGR in comparison with early FGR.

Introduction

Fetal growth restriction (FGR) is defined as failure of the genetic growth potential in the fetus and affects 7–10% of all pregnancies [1]. The main purpose of the management of fetal growth restriction is prediction and prevention of perinatal mortality. Recent reports have confirmed the largest contribution of FGR in the cause of perinatal mortality in nonanomalous fetuses [2]. The use of umbilical artery Doppler velocimetry is the only fetal monitoring associated with a decrease in perinatal mortality [3,4]. Also, abnormal Doppler velocimetry of uterine arteries is comparable with umbilical artery Doppler as a predictor of adverse outcomes in growth restricted fetuses [5–7]. In addition, uterine artery Doppler velocimetry has been shown to be able to identify FGR fetuses at increased risk for adverse perinatal outcomes even though the umbilical artery Doppler velocimetry was normal [7]. In accordance to current approaches on the natural history of growth restriction that differentiates as early-onset and late-onset forms [8]. Early-onset FGR is usually diagnosed with abnormal umbilical and uterine arteries Doppler and is frequently associated with preeclampsia [9]. Also, early-onset FGR is strongly correlated with perinatal death [10]. However, late-onset shows less change in umbilical and uterine arteries Doppler flow pattern, and has less association with preeclampsia [9]. Particularly at the early FGR stage, coexistence of preeclampsia may distort the natural history and fetal deterioration and mortality may occur unexpectedly.

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The diagnosis of fetal "smallness" is performed on the basis of an estimated fetal weight < 10^{th} percentile in spite of lack of sensitivity. But this classification identifies a subset of pregnancies at high risk of poorer perinatal outcome [11]. However, the threshold of EFW confirmed by birthweight was taken below the 5^{th} percentile to catch high risk FGR fetuses [8]. The aim of the present study is to determine factors which affect the perinatal mortalities in early and late FGR fetuses using the threshold of EFW below the 5^{th} percentile.

Materials and Methods

This retrospective study was performed at the Zeynep Kamil Gynecologic and Pediatric Training and Research Hospital, Istanbul, Turkey, between January 2009 and December 2012. The study was approved by the local ethics committee. This study included fetuses that had an antenatal diagnosis of FGR. Gestational age was determined by ensuring that the last menstrual period was confirmed by ultrasound examination as first-trimester crown–rump length. FGR was defined as an EFW < 5^{th} percentile based on sonographic measurements of the fetal head circumference (HC), biparietal diameter (BPD), abdominal circumference (AC), and femur length (FL) according to growth standards [12]. All fetuses considered as growth restriction were justified by birth weight. Fetuses with multiple pregnancy, congenital malformation, chromosomal abnormality, and premature rupture of membrane were excluded.

According to our hospital routine protocol; all FGR fetuses underwent serial sonographic evaluation twice weekly until birth but more frequently, even daily if deemed necessary. Sonographic assessments cover the following: fetal weight, amniotic fluid volume and uterine artery (UtA), and umbilical artery (UA) Doppler assessment. UA recordings were performed on a free floating cord loop in the absence of fetal breathing or movements. Abnormal UA Doppler assessment was defined as a pulsatility index (PI) > 95^{th} percentile [13], absent and reversed end-diastolic blood flow. The UA of FGR fetuses were evaluated according to UA blood flow characteristics (BFC) as follows: BFC 0, normal UA blood flow velocity waveform (PI $\leq$ 95^{th} percentile); BFC 1, forward diastolic blood flow with PI $\geq$ 95^{th} percentile; BFC 2, absent diastolic blood flow; and BFC 3, reversed diastolic blood flow. Doppler examination of the UtA was performed as bilaterally at the same time. Color Doppler was used to visualize the crossing of the uterine and external iliac arteries. UtA Doppler velocimetry was measured cranial of the vessel "crossing". The presence of a diastolic notch in the flow-profiles of the UA was noted qualitatively, and the PI was calculated from averaging the three waveforms of satisfactory quality. PI > 2 standard deviation (SD) was considered abnormal [14]. The blood flow waveform of the UtA was classified as UtA score (UtAS) according to Gudmundsson et al [15]. UtAS 0 indicated normal blood velocity waveform, PI $\leq$ 2 SD, and no notch present in either uterine arteries; UtAS 1 indicated PI > 2 SD or the presence of notch in one uterine artery; UtAS 2 indicated two abnormal parameters and notch or PI > 2 SD; UtAS 3 indicated three abnormal parameters; and UtAS 4 indicated PI > 2 SD and the presence of notch in both uterine arteries. Abnormal uterine artery Doppler was defined as UtAS 1–4.

Our sample was grouped as early and late FGR defined as an EFW < 5^{th} percentile. Early FGR fetuses was classified as gestational age at birth 34 weeks or less, late FGR was classified as gestational age at birth > 34 weeks. Corticosteroids to promote fetal lung maturation were administered to all early FGR fetuses. Comparisons of these groups were made to maternal demographics, baseline characteristics, sonographic findings, and pregnancy outcomes. The perinatal mortality was calculated by adding the number of stillbirths and neonatal deaths. Comparisons to maternal demographics, baseline characteristics, and sonographic findings were made between FGR fetuses that have perinatal mortalities and alive at hospital discharge.

Pregnancy-induced hypertension was defined as blood pressure $\geq$ 140/90. Preeclampsia was defined as blood pressure $\geq$ 140/90 mmHg in the presence of proteinuria as $\geq$300 mg/dl on a 24-hour collection of urine. Hemolysis, elevated liver enzymes, low platelets (HELLP) syndrome was defined as alanine aminotransferase > 70 IU/L with platelets < 100×10^9/L and with evidence of hemolysis from blood or lactate dehydrogenase (LDH) > 600 U/L.

The decision for time and mode of delivery was made by senior obstetricians based on gestational age, none or poor fetal growth in repeated sonography every 3–4 weeks, absent or reversed end-diastolic flow in the umbilical artery, nonreassuring fetal tracing, oligohydraamnios, and maternal and obstetrical indications necessitate delivery, for example, severe eclampsia or placental abruption. Placental abruption was defined as a vaginal bleeding and/or uterine tenderness and nonreassuring fetal status leading to an emergency delivery, and an evidence of retroplacental bleeding or clot of postdelivery examination of the placenta.

Statistical analysis was performed using SPSS version 11.5 for Windows (SPSS Inc., Chicago, IL, USA). Data were expressed as numeric (%) or mean ± standard deviation (SD) values, as appropriate. Kolmogorov–Smirnov tests were performed for the distribution of continuous data. Statistical analyses were performed by Student *t* test for normal distribution data and Mann–Whitney *U* test for abnormal distribution data. Chi-square and Fisher's exact tests were used for comparison of categorical variables. Statistical significance was set at $p \leq 0.05$.

Results

The study included 271 FGR fetuses. Of these, 86 (31.7%) FGR fetuses were early FGR. The maternal demographic characteristics, obstetric histories, and perinatal clinical characteristics are shown in Table 1. The mean gestational age at delivery was 35.43 ± 3.81 weeks and the mean ultrasound estimated gestational age at delivery was 31.07 ± 3.49 weeks. The mean birth weight was 1812.75 ± 634.75 g. Preeclampsia occurred in 95 of the 271 (35.1%). The rate of cesarean delivery was 75.2%. Nine fetuses (3.3%) died during the follow up. The number of newborns admitted to neonatal intensive care unit (NICU) was 138 (52.7%). A total of 22 newborns died in the neonatal period. The perinatal mortality rate was 11.4%.

Table 2 shows the comparison of maternal demographic characteristics, obstetric histories, and perinatal clinical characteristics between the early and late FGR groups. The early FGR group had a significantly higher maternal age and gravidity. Obstetric history of prior preeclampsia and prior FGR, preeclampsia, and placental abruption in the current pregnancy were found significantly higher in the early FGR group. Amniotic fluid index was significantly lower in the early FGR group. The rate of cesarean delivery was higher in the early FGR group. Perinatal death rate in the early FGR group and late FGR group were found to be 32.6% and 1.6%, respectively. Abnormal UA and UtA Doppler were significantly higher in the early FGR group.

When compared to perinatal mortalities and live newborns at hospital discharge (Table 3), the mean gestational age at delivery and the mean ultrasound estimated gestational age at delivery were significantly lower in perinatal mortalities. Also, the mean birth weight was significantly lower in perinatal mortalities. Prior stillbirth, preeclampsia, and placental abruptions were found significantly higher in women that had perinatal death. The degree of increasing vascular impedance of UtA showed significant correlation with perinatal death. Also, the degree of abnormality of

Table 1
Maternal demographic characteristics, obstetric histories, and perinatal clinical characteristics.

Characteristics	$n = 271$
Maternal age (y)	27.25 ± 5.47
Gravity	1.89 ± 1.37
Parity	1.14 ± 0.92
GA at delivery (wk)	35.43 ± 3.81
Ultrasound estimated GA at delivery (wk)	31.07 ± 3.49
AFI (mm)	75.35 ± 38.02
Last scan EFW (g)	1810.77 ± 608.32
Last scan EFW <3rd percentile	211 (77.9)
Birthweight (g)	1812.75 ± 634.75
Birthweight <3rd percentile	211 (77.9)
1-min Apgar score	6.77 ± 1.67
5-min Apgar score	8.25 ± 1.39
Nulliparity	61 (22.5)
Smoker	2 (0.7)
History of FGR	10 (3.7)
History of stillbirth	6 (2.2)
History of preeclampsia	13 (4.8)
Chronic hypertension	4 (1.5)
Pregestational diabetes	1 (0.4)
Gestational diabetes	18 (6.6)
Gestational hypertension	4 (1.5)
Preeclampsia	95 (35.1)
HELPP syndrome	4 (1.5)
Placental abruption	10 (3.7)
Mode of delivery	
Cesarean	197 (75.2)
Vaginal	74 (24.8)
Male gender	130 (48)
Perinatal death	31 (11.4)
Antepartum death	9 (3.3)
Neonatal death	22 (8.1)

Data are presented as *n* (%) or as mean ± standard deviation.
AFI = amniotic fluid index; EFW = estimated fetal weight; FGR = fetal growth restriction; GA = gestational age; HELPP = hemolysis, elevated liver enzymes, low platelets.

diastolic blood flow in UA Doppler showed a significant relation to perinatal death. A total of 90.3% of perinatal deaths had an EFW < 3rd percentile. Amniotic fluid index was significantly lower in perinatal deaths. However, there was no significant difference between perinatal deaths and live group considering only the early FGR group. However, AFI of the three perinatal deaths in the late FGR group were severe oligohydramnios.

Eight of nine stillbirths were in the early FGR group. Seven of these eight stillbirths had high UtA scoring (1 UtAS-3 and 6 UtAS-4). Twenty of 22 neonatal deaths were in the early FGR group. The degree of increasing vascular impedance of UtA showed significant correlation with neonatal death. All of the 20 neonatal deaths in the early FGR group were observed in ≥ UtAS-2. When we look at UA flow; seven of eight stillbirths had abnormal UA Doppler, and one had normal UA flow Doppler. In respect to fetus having normal UA, UtAS found four. One of nine intrauterine fetal deaths were in the late FGR group. This fetus did not have any pathology in UtA and UA. Two of 22 neonatal fetal dead were in the late-onset FGR group. Both had low UtA and UA score between 0 and 1. Table 4 shows the distribution of UtA and UA as UtAS and BFC, respectively.

In addition, FGR fetuses with UtAS-4 showed statistically significant higher placental abruption and perinatal deaths than other groups (p: 0.0001).

Discussion

Fetal growth restriction is the most common risk factor associated with perinatal mortality after excluding congenital anomalies. The prediction and prevention of perinatal mortality is the main purpose of the management of fetal growth restriction. Recent studies have shown the early-onset forms of FGR represent more severe conditions and more links with perinatal mortalities [10].

In this retrospective study, the remarkable feature of perinatal deaths is that they more commonly occurred in the early FGR group. In agreement with the literature [16], in this study, early FGR represented 31.7% of all FGR fetuses and presented in association with early PE in up to 57%. Abnormal Doppler velocimetry of both UtA and UA were strongly correlated with perinatal death in early FGR. Only two of the perinatal deaths had a normal umbilical artery. However, both had an abnormal uterine artery as UtAS-4 and were complicated by preeclampsia and placental abruption. Abnormal umbilical and uterine arteries were 92.8% and 96.4%, respectively in perinatal death. When we examined neonatal death, abnormal umbilical and uterine arteries were 96% and 100%, respectively. All perinatal deaths with abnormal uterine artery were ≥ UtAS-2. A total of 50% of perinatal deaths in early FGR had reverse umbilical artery. All of them (14 pregnancies) had abnormal uterine artery velocimetry as ≥ UtAS 2. Also, all fetuses that had a reversed umbilical artery in the early FGR had uterine artery score ≥ 2. Furthermore, 51.6% of perinatal death had UtAS-4 (bilateral uterine artery PI > 2 SD and the presence of notch in both uterine arteries). Considering overall early FGR pregnancies, 22 % FGR fetuses with UtAS-4 had placental abruption.

In our study, perinatal deaths occurred more commonly in early FGR with preeclampsia and an EFW confirmed by birth weight < 3rd percentile. Similar to our results, the Prospective Observational Trial to Optimize Paediatric Health in Intrauterine Growth Restriction (PORTO) study [17] emphasized association between perinatal death and EFW < 3rd percentile and abnormal umbilical artery Doppler. Also, the PORTO study included six perinatal deaths between 24^{+6} weeks and 35^{+0} weeks. They found EFW < 3rd percentile as 83% and abnormal umbilical artery as 67%. In our study, all of the stillbirths and 91% of the neoanatal deaths were associated with EFW < 3rd percentile and rate of abnormal umbilical artery Doppler was a higher rate compared to the PORTO study. Moreover, in the PORTO study, two of the six perinatal deaths with normal umbilical artery were attributed to pulmonary hypoplasia due to prolonged preterm rupture of the membranes. We excluded the patients with preterm rupture of the membranes as preterm rupture of membranes could affect perinatal death independent from FGR.

In this study, the perinatal mortality rate (32.5%) was very high in the early FGR group compared to the Trial of Randomized Umbilical and Fetal Flow in Europe (TRUFFLE) study (8%) [18] which found higher the average birth weight in perinatal deaths than this study. In support of our study results, the TRUFFLE study emphasized the presence and severity of maternal hypertensive condition as a major determinant of perinatal deaths and the effect of an earlier gestational age and a lower birth weight on perinatal deaths.

When we examined our results uterine artery Doppler score-4 seems to be identifying fetuses with a risk of death and placental abruption whatever the umbilical artery Doppler pattern for early FGR fetuses. Ghosh and Gudmundsson [7] found strong correlation between degree of increasing vascular impedance of uterine and umbilical arteries and adverse perinatal outcomes in FGR fetuses. However, this study focused on pregnancies suspected of fetal growth restriction. Adverse perinatal outcomes consisted of small-for-gestational-age (SGA), delivered by cesarean section, delivered prematurely, and admitted to NICU. They did not group their FGR fetuses as early and late-onset. They had four stillbirths, three of them with abnormal UtA and all of them with abnormal umbilical artery. They did not give any information regarding neonatal death. They emphasized that there is no scientific evidence that abnormal

Table 2
Maternal demographic characteristics, obstetric histories, and perinatal clinical characteristics between the early and late FGR groups.

Variables		≤ 34 wks ($n = 86$)	> 34 wks ($n = 185$)	p
Maternal age (y)		28.88 ± 5.44	26.49 ± 5.33	0.001
Gravidity		2.19 ± 1.56	1.75 ± 1.26	0.01
Parity		1.30 ± 1.01	1.06 ± 0.87	NS
Ultrasound estimated GA at delivery (wk)		27.06 ± 2.0	32.94 ± 1.81	0.0001
GA at delivery (wk)		30.78 ± 2.64	36.23 ± 3.03	0.0001
AFI (mm)		63.09 ± 40.73	81.48 ± 35.14	0.001
Last scan EFW (g)		1104.13 ± 391.21	2141.05 ± 358.51	0.0001
Last scan EFW <3rd percentile		73 (84.9)	138 (74.6)	
Birthweight (g)		1075.37 ± 412.73	2156.54 ± 374.52	0.0001
Birthweight <3rd percentile		73 (84.9)	138 (74.6)	1
1-min Apgar score		5.42 ± 1.91	7.34 ± 1.16	0.0001
5-min Apgar score		7.19 ± 1.86	8.70 ± 0.78	0.0001
Nulliparity		20 (23.3)	41 (22.2)	NS
History of FGR		6 (7)	4 (2.2)	0.05
History of stillbirth		4 (4.7)	2 (1.1)	NS
History of preeclampsia		8 (9.3)	5 (2.7)	0.018
Chronic hypertension		3 (3.5)	1 (0.5)	NS
Gestational diabetes		7 (8.1)	11 (6)	NS
Gestational hypertension		0	4 (2.2)	NS
Preeclampsia		49 (57)	46 (25)	0.0001
Placental abruption		7 (8.1)	3 (1.6)	0.013
Mode of delivery				
Cesarean		73 (85)	125 (67.6)	0.003
Vaginal		13 (15)	60 (32.4)	
Stillbirth		8 (9.3)	1 (0.5)	0.001
Neonatal death		20 (25.6)	2 (1.1)	0.0001
Perinatal death		28 (32.6)	3 (1.6)	0.0001
UtAS	0	12 (15.4)	113 (61.4)	
	1	9 (11.5)	28 (15.2)	
	2	23 (29.5)	25 (13.6)	0.0001
	3	11 (14.1)	11 (6)	
	4	23 (29.5)	7 (3.8)	
BFC	0	24 (30.8)	130 (70.7)	
	1	14 (17.9)	49 (26.6)	0.0001
	2	26 (33.3)	5 (2.7)	
	3	14 (17.9)	0	

Data are presented as n (%) or as mean ± standard deviation.
AFI = amniotic fluid index; BFC = blood flow classification; EFW = estimated fetal weight; FGR = fetal growth restriction; GA = gestational age; NS = not significant; UtAS = uterine artery score.

uterine artery Doppler alone constitutes an indication for delivery but uterine artery Doppler seems to be able to identify fetuses at increased risk, even though the umbilical artery Doppler is normal in support of the present study result.

In agreement with literature late FGR showed less changes in umbilical and uterine arteries Doppler flow, and had lower incidence of preeclampsia in comparison with early FGR [11,19]. At the same time, recent literature emphasized the UtA Doppler PI can be abnormal in the presence of normal UA Doppler in the late group and predicts a poorer outcome [11,19]. Also, Savchev et al [20] emphasized the EFW < 3rd percentile have a much higher risk of adverse perinatal outcome irrespective of Doppler pattern in late FGR. However, we did not find any study about factors which effect perinatal mortality in late FGR. We had three perinatal mortalities in the late group. But, in this group abnormality of uterine and umbilical artery seems negligible. However, birth weight of all perinatal deaths in the late group was below the 3rd percentile. Also, we found all perinatal deaths in the late group had severe oligohydramnios. But, Chauhan et al [21] did not find any association with perinatal death in SGA fetuses at meta-analysis of 18 randomized studies.

We also found the history of prior stillbirth was one of the important factors for perinatal mortality in pregnancies with FGR. Similarly, Freeman et al [22] emphasized prior stillbirth was a significant risk factor, especially when associated with a diagnosis of hypertension or clinical fetal growth restriction. However, Smith and Fretts [23] emphasized that prior delivery of a growth restricted infant is among the strongest risk factors for stillbirth, comparable to the history of prior stillbirth.

This study has some limitations. We did not exactly distinguish FGR and SGA as described by the recent literature [11]. But, we accept the 5th percentile as a threshold of EFW confirmed by birth weight to catch FGR fetuses. Also, we had to differentiate early and late FGR groups looking at gestational age at birth due to our study retrospective.

In conclusion, the abnormal umbilical and uterine arteries Doppler, coexistence preeclampsia, and confirmed EFW by birth weight < 3rd percentile are observed important factors in perinatal mortality in early FGR. The EFW < 3rd percentile and severe olgohydramnios seems to a contributing factor for perinatal death in late FGR. Bilateral uterine arteries abnormality as notch and high PI seems to be identifying fetuses with the risk of death and placental abruption whatever the umbilical artery Doppler pattern in early FGR fetuses. When we choose expectant management, the results of the present study suggest that attention should be given to percentile of the EFW and uterine artery in early FGR with preeclampsia and an abnormal umbilical artery. Prospective studies focus on the degree of vascular impedance of the uterine artery Doppler on management protocols of FGR and how we can predict the perinatal mortality in late FGR.

Table 3
Maternal demographic characteristics, obstetric histories, and perinatal clinical characteristics between perinatal mortalities and live newborns at hospital discharge groups.

		Perinatal mortalities ($n = 31$)	Alive at hospital discharge ($n = 240$)	p
Maternal age (y)		28.97 ± 5.65	27.03 ± 5.41	NS
Gravidity		2.03 ± 1.17	1.87 ± 1.39	NS
Parity		1.32 ± 0.98	1.11 ± 0.91	NS
GA at enrolment (wk)		24.93 ± 3.19	31.87 ± 2.65	0.0001
GA at delivery (wk)		29.22 ± 3.58	36.23 ± 3.03	0.0001
AFI (mm)		52.46 ± 39.08	78.38 ± 36.92	0.001
Last scan EFW (g)		832.42 ± 460	1937.67 ± 500.74	0.0001
Last scan EFW < 3rd percentile		28 (90.3)	183 (76.2)	
Birthweight (g)		798.65 ± 437.01	1943.74 ± 529.69	0.0001
Birthweight < 3rd percentile		29 (93.5)	181 (75.4)	
Nulliparity		6 (19.4)	55 (22.9)	NS
History of FGR		2 (6.5)	8 (3.3)	NS
History of stillbirth		3 (9.7)	3 (1.2)	0.003
History of preeclampsia		3 (9.7)	10 (4.2)	NS
Chronic hypertension		0	4	
Gestational diabetes		1 (3.2)	17 (7.1)	NS
Gestational hypertension		0	4	
Preeclampsia		21 (67.7)	74 (30.8)	0.0001
Placental abruption		7 (22.6)	3 (1.2)	0.0001
Mode of delivery				
Cesarean		22 (71)	176 (73.3)	NS
Vaginal		9 (29)	64 (26.7)	
UtAS 0		3 (9.7)	124 (51.7)	
	1	1 (3.2)	36 (15)	
	2	9 (29)	39 (16.2)	0.0001
	3	2 (6.5)	21 (8.8)	
	4	16 (51.6)	20 (8.3)	
BFC	0	4 (12.9)	152 (63.3)	
	1	5 (16.1)	59 (24.6)	0.0001
	2	8 (25.8)	25 (10.4)	
	3	14 (45.3)	4 (1.7)	

Data are presented as n (%) or as mean ± standard deviation.
AFI = amniotic fluid index; BFC = blood flow classification; EFW = estimated fetal weight; FGR = fetal growth restriction; GA = gestational age; UtAS = uterine artery score.

Table 4
Distribution of uterine artery score and blood flow characteristics of umbilical artery in perinatal mortalities.

	UtAS-0	UtAS-1	UtAS-2	UtAS-3	UtAS-4
BFC-0	2(late)		0	0	2
BFC-1	1	1(late)	1	0	2
BFC-2			2	2	4
BFC-3			6	0	8

BFC = blood flow characteristics; late = late fetal growth restriction; UtAS = uterine artery score.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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