Perinatal Outcome in Growth Restricted Fetuses in A Tertiary Care Hospital of North India

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Abstract: Background: Fetal growth restriction refers to a fetus that has failed to achieve its genetically determined growth potential and is associated with an increased perinatal mortality and morbidity. Objectives: To observe the outcome of the fetal growth restricted fetuses diagnosed at or more than 26 weeks of gestation in a tertiary care hospital of North India. Settings and design: prospective observational study. Methods: The study was conducted on 96 antenatal women diagnosed with foetal growth restriction at/after 26 weeks of gestation who were managed conservatively depending on the ultrasonographic doppler findings and maternal disease over a period of one year. Pregnancy outcome was observed and statistically analysed. Results: 91% women were booked and 60% were between 34 weeks to 40 completed weeks of gestation depicting a late onset foetal growth restriction. Preeclampsia was the most common indication of admission (44.79%). Abnormal doppler findings were observed in 85.4% women; the maximally affected (83.3%) foetal vessel was the umbilical artery. 82.29% women delivered by cesarean section. Adverse perinatal outcome was observed in 55.2% neonates. Maximum perinatal mortality rate (46.15%) was observed in 26- 30 weeks of gestation. Conclusions: Fetal growth restriction (FGR) is associated with an increased perinatal mortality and morbidity. Accurate and timely detection of FGR, good antenatal and neonatal care can improve the perinatal outcome of growth restricted fetuses to some extent. [Shweta G NJIRM 2017; 8(3):17-21]

Key words: fetal doppler, fetal growth restriction, intrauterine growth restriction, low birth weight, Perinatal outcome, small for gestation

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Introduction: Foetal Growth Restriction (FGR) refers to a condition in which the foetus is unable to achieve its genetically determined potential size [1] and an estimated foetal weight is less than the 10th percentile corresponding to the gestational age[2]. It is a serious anomaly in the antenatal period and is responsible for several fold increase in the pregnancy wastage in the form of pre-term labour, birth asphyxia, respiratory distress syndrome, meconium aspiration, neonatal sepsis, hypoglycaemia and hypothermia. It affects upto 10% of the total pregnancies[1] and 20% of stillborn infants have FGR. Perinatal mortality rates are 4 to 8 times higher for growth-restricted infants. Morbidity is present in 50% of the surviving infants. The failure of a foetus to attain its expected growth may result from different complications; the final common pathway most often encountered is via uteroplacental insufficiency. Placental insufficiency promotes compensatory changes in the foetal circulation i.e. development of abnormal vascular resistance patterns. This leads to compromise of foetal wellbeing with 6 - 10 times higher risk of perinatal mortality[3]. Accurate and timely detection of FGR can prevent adverse outcome of pregnancy to some extent. Our study aimed to observe the outcome of the fetal growth restricted fetuses diagnosed at or more than 26 weeks of gestation and managed till delivery in a tertiary care hospital of North India over a period of one year.

Methods: This was a prospective observational longitudinal study conducted on antenatal women diagnosed with foetal growth restriction at/after 26 weeks of gestation, who were admitted in the labour room unit of the department of Obstetrics and Gynaecology at Dayanand Medical College and Hospital, Ludhiana from 1st January to 31st December 2013. Approval from the Ethical committee was taken. Women with singleton pregnancy of $\geq$ 26 weeks of gestation, with a discrepancy of more than 4 weeks on clinical evaluation or effective fetal weight (EFW) less than 10th percentile of the corresponding gestational age on Ultrasonography, irrespective of the maternal disease were included in the study. Fetuses with diagnosed chromosomal abnormalities or structural anomalies, multiple gestation and intrauterine foetal demise were not included.

After enrollment of the eligible patients, informed written consent was taken. Detailed history including age, parity, last menstrual period and previous pregnancy outcomes was recorded. Medical history including hypertension, diabetes, asthma, renal disease, heart disease was noted. Gestational age was calculated from the first day of the last menstrual period and/or early first trimester ultrasound.

Examination included maternal parameters (maternal weight gain, symphysio-fundal height, abdominal

girth), clinical foetal parameters (fundal height, estimated foetal weight, amount of liquor). Investigations pertaining to maternal disease were sent. All the patients were subjected to ultrasound and doppler examination for foetal biometry which included assessment of biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femoral length (FL). Effective foetal weight, amniotic fluid index, placental maturity grade, corresponding gestational age were noted. Foetal weight was estimated according to the Hadlock formulae [4] that use FL, AC and BPD. Foetal weight less than 10th percentile, based on the chart given by Battaglia and Lubchenco[5,6] was taken as growth restricted foetus.

Conservative management was done depending on the doppler findings and maternal disease. Pregnancy was terminated according to the maternal condition and other obstetric indications. Data regarding pregnancy and pregnancy outcome in terms of period of gestation at birth, mode of delivery, neonatal birth weight, Apgar score, Neonatal intensive care unit (NICU) admissions, still births and neonatal deaths was recorded.

The perinatal outcome was divided into adverse and non-adverse outcomes. Adverse perinatal outcome included stillbirths, neonatal deaths, 5 minute Apgar score less than 7, intubations, NICU stay more than 7 days. Non-adverse outcome included neonates with NICU stay less than 7 days and/ or neonates who were shifted to mother side after birth and had no NICU stay. Data were statistically analyzed using chi-square test and student t test wherever applicable.

Results: The study was conducted on 96 antenatal women diagnosed with foetal growth restriction at/after 26 weeks of gestation. The age of the women ranged from 20 to 40 years, majority (47.9%) were in the 26-30 years and least (4.2%) in the age group more than 35 years. Of the 96 women, 51% were primigravida and 49% were multigravida (p value = 0.773); 91% were booked and 9% were unbooked which was statistically significant (p value <0.001). Maximum (60%) women were between 34 weeks to 40 completed weeks of gestation depicting a late onset foetal growth restriction. Preeclampsia was the most common indication of admission (44.79%), FGR with oligohydramnios was observed in 31.25%, unexplained foetal growth restriction in 18.75% and anemia in 5.21% cases.

Placental grading was done on the basis of Grannum's classification[7]. 50.0% had placental grade II, 38.5% had grade III and 11.5% women had grade I placenta. Abnormal doppler findings were observed in 85.4% women which was statistically significant (p value <0.001)

In our study, maximally affected foetal vessel was the umbilical artery showing abnormal velocimetry in 83.3% women. Foetal growth restriction with preeclampsia was the most common indication of admission where 90.69% patients had abnormal doppler findings.

We observed that 82.29% women had undergone cesarean section as compared to 17.70% women who had a vaginal delivery, showing a statistical significance (p value <0.001). There were 5.20% stillbirths in our study as compared to 94.79% live births (p value <0.001). Table 1 shows the distribution of the neonates according to their birth weights. Adverse perinatal outcome was observed in 53 (55.2%) neonates as compared to 43 (44.7%) with non-adverse perinatal outcome showing statistical significance (p value < 0.001). Table 2 shows the distribution of adverse perinatal outcome observed in the neonates.

Table 3 shows the distribution of perinatal mortality in different gestational age groups. Maximum perinatal mortality rate (46.15%) was observed in 26-30 weeks of gestation that decreased with the increase in the gestation at delivery. Table 4 shows the correlation of the umbilical artery doppler with foetal outcome. The perinatal mortality in fetuses with abnormal doppler was 18.75% as compared to 12.5% in normal doppler group.

Table 1: Distribution of neonates according to birth weights

Category	Birth weight	No. of neonates	Percentage
ELBW	< 1000g	24	25.0%
VLBW	1001- 1500g	26	27.0%
LBW	1501- 2500g	46	48.0%
Total		96	100%

Table 2: Distribution of Adverse perinatal outcome

Adverse Perinatal outcome	No. of patients	Percentage
Still births	5	5.20%
Low Apgar score < 7 (5 MIN)	5	5.20%
NICU stay > 7 days	39	40.62%
Intubated	23	23.9%
Expired	12	12.5%

Table 3: Distribution of perinatal mortality in different gestational age groups

Gestational age at time of birth	Total births	Perinatal mortality	Percentage mortality
26-30 weeks	13	6	46.15%
31- 33 weeks	26	6	23.07%
34- 36 weeks	32	3	9.37%
>37 weeks	25	2	8.00%

Table 4: Correlation of umbilical artery Doppler with foetal outcome

Foetal outcome	Total	Normal Doppler	%	Abnormal Doppler	%	p value
Low Apgar (5min Apgar <7)	5	2	40	3	60	0.527
Intubated	23	3	13.04	20	86.95	<0.001
Still birth	5	1	20	4	80	0.058
Expired	12	1	8.33	11	91.66	<0.001
NICU stay > 7 days	39	6	15.38	33	84.61	<0.001

Discussion: Foetal growth restriction does not imply a specific pathophysiology but merely a result of a series of events occurring along several possible pathways. Hence, one of the major goals of antepartum foetal surveillance is the appropriate and timely identification of compromised foetus and to deliver the most mature foetus.

Maximum number of women (47.9%) were in the age group of 26- 30 years. This can probably be attributed to the increased pregnancy rate in this age group. 51% women were Primigravida and 49% were multigravida. Hence no significant statistical differences were observed in the pregnancy outcome by the parity of the patients. Riza Midazli et al[8] and Arora Devendra et al [9] observed no significant difference in mean maternal age and parity while TA Mills et al[10] observed that parity was higher in normal study group. Regular antenatal visits help in detecting inadequate foetal growth at the earliest and hence the outcome is affected.

In our study, 91% women were booked whereas 9% women were unbooked. Danish et al[11] concluded that antenatal check-ups improve the detection rate of FGR, hence there were more number of booked patients in our study.

We observed that 40% of the women were at less than 34 weeks of gestation depicting early onset FGR whereas 60% of the pregnancies were monitored between 34– 40 weeks of gestation when the foetus has developed sufficient lung maturity to survive outside the uterus, depicting a late onset FGR. Deshmukh et al[12] noted similar findings and concluded that perinatal outcome was better in foetuses with late onset FGR.

The failure of a foetus to attain its expected growth may result from different complications but the final common pathway most often encountered is via uteroplacental insufficiency. In this series among the various risk factors preeclampsia was a significant risk factor for FGR that was seen in 44.79% of the cases. This observation was in agreement with Coleman et al[13].

31.25% women presented with oligohydramnios. Frank A Manning et al[14] noted that decreased amniotic fluid volume could be due to chronic intra uterine stress with decreased foetal contribution to the amniotic fluid pool due to uteroplacental insufficiency. In our study maximum number of placentae were grade II (50%) followed by grade III (38.5%). These findings were supported by the study

done by Dudley et al[15] where they found that grade II-III placentae were seen in 62% of small for gestational age fetuses.

Doppler is in use since 1977 for the evaluation of foetal circulatory system. In our study, we found that 85.4% women with foetal growth restriction had abnormal doppler findings. This is in agreement with the study done by Fleischer et al[16].

In our study 82.29% women presenting with foetal growth restriction underwent cesarean section. Similar findings were seen by Visentin et al[17] where 83.3% women with FGR delivered by cesarean section. The total number of live births in our study was 94.97% as compared to 5.20% stillbirths. Visentin et al[17] observed all live births in their study while Mazarico et al[18] observed 85% live births and 15% stillbirths. The variation in the sample size and the risk factors included can be attributed to the difference in the studies. Maximum number of babies (48%) was low birth weight, 27% were VLBW and 25% were ELBW babies. Similar findings were noted by Visentin et al[17] and Mazarico et al[18].

Adverse perinatal outcome was seen in 55.2% fetuses, which included 17.70% perinatal mortalities, 5.20% babies with low Apgar score, 40.62% neonates with prolonged NICU stay and 23.9% babies who were on ventilatory support. Our study suggested that gestational age at birth was a main contributor to the perinatal deaths. We have observed maximum perinatal mortality rate (46.15%) in 26-30 weeks of gestation that declined to 8.00% at term. Peter Holmqvist et al[19] noted that total perinatal mortality in FGR was 25.62% and 46.7% fetuses have adverse perinatal outcome.

The most common risk factor for FGR was preeclampsia, and 90.69% women presenting with preeclampsia had abnormal umbilical artery Doppler flow. Similar findings were seen in a study done by B Mallikarjunappa et al[20] where 84% patients with preeclampsia had abnormal umbilical artery doppler flow studies and only 16% patients had normal doppler findings.

Fetuses with abnormal umbilical artery velocimetry had prolonged NICU stay (42% vs. 16%), increased number of intubations (25% vs. 13%), increased perinatal mortality (18.75% vs. 12.5%) as compared to fetuses with normal Doppler. Deshmukh A et al[21] noticed similar poor perinatal outcome. Similar findings were noted by Seyam et al[22] and Mc Cowen et al[23].

The results of the present study demonstrated the need for regular antenatal visits and detection of growth restricted fetuses on clinical and ultrasound examination. Fetal doppler is efficacious in allowing conservative management of such fetuses and in predicting fetal outcome. Timely detection of adverse events and intervention is important to improve the perinatal outcome.

Conclusion: The risks of high perinatal morbidity and mortality to the growth impaired fetuses are well documented. Currently, although the incidence of FGR has not changed appreciably, the prognosis for small for gestational age (SGA) infants has improved dramatically due to the improved NICU facilities. In the fetuses who are managed expectantly, antepartum injury or death may occur despite best possible fetal surveillance methods available. In preterm FGR, which occurs before 34 weeks gestation, iatrogenic prematurity is a pertinent issue. The goal of management in foetal growth restriction is to deliver the most mature foetus in the best physiological condition. Abnormal doppler findings indicate foetal jeopardy, which has led to premature termination of pregnancies resulting in tremendous increase in cesarean sections and premature babies that need NICU care and ventilatory support. Hence growth restricted foetuses with placental insufficiency require antenatal testing using multiple surveillance modalities. We conclude that once doppler becomes abnormal a more vigilant foetal surveillance should be carried out with other testing modalities so as to prolong the pregnancy and minimize the risk of prematurity.

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