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Early Diagnosis of Intrauterine growth retardation by using Ultrasonography Foetal Biometric Parameters

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Abstract

Background & Method: A prospective observational study conducted in Department of Obstetrics and Gynaecology in G.R. Medical College, Gwalior from 2017 to 2019. The study was conducted with 100 antenatal subjects who were selected from the outpatient Department. All the women had a singleton pregnancy of 28-30 weeks gestation. **Result:** Uterine Artery doppler S/D Ratio: abnormal (Right 16%, Left 12%), Uterine doppler Artery RI Ratio: abnormal (Right 15%, Left 21%), Uterine doppler ED Notch: 8%, Umblicaldoppler Artery S/D Ratio: Abnormal 15%, Umblicaldoppler Artery RI Ratio: Abnormal 19% **Conclusion:** Biometric indices of USG specially abdominal circumference and its relation with head circumference and femur length are also good indicators to predict IUGR. Uterine Doppler evaluation in the second or third trimester has been proposed as a screening tool for early onset IUGR especially associated with preeclampsia. Ultrasound biometry and Doppler velocimetry was performed on 100 clinically suspected cases for evaluation of IUGR pregnancy. The EFW was determined using standard biometric measurements and expressed as percentiles. Using color flow and pulse Doppler, resistance indices and systolic and diastolic ratio of uterine umbilical arteries were determined. Pregnancy outcome was ascertained by reviewing maternal and field charts. The statistical analysis system was used to analyze the data.

Keywords: Ultrasonography, IUG, Retardation & Fetal.

Introduction

Intrauterine growth retardation (IUGR) is one of the most important complications encountered during pregnancy. The growth-restricted fetus is a fetus that fails to reach its growth potential and is at risk for adverse perinatal outcome. The American College of Obstetricians and Gynecologists (ACOG) defines an intrauterine growth restricted fetus as a fetus with an estimated weight below the 10th percentile of its respective gestational age.[1] IUGR remains a challenging problem in developing country, it affects almost 30 million infants each year and this is associated with significant neonatal mortality and morbidity as it carries potential long term complications throughout life like pneumonia, meconium aspiration hypoglycemia and some long term impairments like neurodevelopment disability, cardiovascular disorders. Perinatal mortality in IUGR is 3.6%.[2]

IUGR has many causes including placental insufficiency due to maternal disorder like hypertension, renal disease, collagen vascular disease, poor nutrition, alcohol and drug abuse, viral infections and fetal chromosomal anomaly.[3] The overall prevalence of IUGR must be 10% as per definition. In healthy and well nourished mothers IUGR occurs in 3-5% patients. In hypertension and previous growth retarded fetus it is 25% or higher[4].

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Fetal growth restriction, also known as intrauterine growth restriction, is asonographic diagnosis most commonly used to describe a fetus with an estimated fetal weight that is below the 10th percentilefor gestational age. This definition is recommended by American college of obstetrics and gynecology (ACOG).[1] decreased length and head circumference, loss of adipose tissue and muscle mass as well as decreased organ weights has been associated with IUGR.[5].

Material & Method

A prospective observational study conducted in Department of Obstetrics and Gynaecology in G.R. Medical College, Gwalior from 2017 to 2019. The study was conducted with 100 antenatal subjects who were selected from the outpatient Department. All the women had a singleton pregnancy of 28-30 weeks gestation.

Inclusion criteria

1. Singleton pregnancy with gestational age between 28-30 weeks.
2. Women with reliable dating of pregnancy with known LMP.

Exclusion criteria

1. All subjects with history of rupture of membranes, active labour, multiple pregnancies and fetuses with congenital anomalies.

Methodology of the Study

The subjects enrolled for the study were followed up from the point of recruitment up tot the time of delivery. Screening and diagnosis for IUGR includes:

1. Accurate determination of the gestational age.
2. Abdominal palpation of determine fundal height during each antenatal visit.

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3. Ultrasound examination of a suspected SGA fetus with color doppler.
4. Assessment of fetal well-being when an SGA fetus or IUGR fetus is diagnosed, includes Doppler studies and cardiotocography monitoring (CTG).

Accurate Determination of gestational age done by LMP and Comparing it with 1st Trimester USG if available. If the earliest Ultrasound is between 13 and 24 weeks of pregnancy and the last menstrual period (LMP) is certain, with regular menstruation, and there is a difference of less than 10 days between LMP and ultrasound, LMP estimate has fair accuracy.

Statistical analysis
All data was analyzed using the Microsoft Excel software. Statistical analysis of data was done after compiling and tabulation of data. The sensitivity, specificity, positive predictive value, percentage of false positive and negative results were calculated and compared with other studies.

Results

Table 1: Type of delivery

Type of delivery	No. of subjects	Percent
Vaginal Delivery	77	77
LSCS	23	23

77% of patients had Vaginal Delivery
23% of patients had Emergency LSCS

Table 2: Biometry findings of the study population

Biometry		Frequency	Percent
HC/AC	Normal	54	54
	Abnormal	46	46
	Total	100	100
FL/AC	Normal	48	48
	Abnormal	52	52
	Total	100	100

Raised HC/AC - 46%
Raised FL/AC – 52%
Both HC/AC and FL/AC – 42%

Table 3: Uterine and umbilical artery Dopplerfindings of the study population

Doppler Findings			Frequency	Percent
Uterine Artery SD	Right	Normal	84	84
		Abnormal	16	16
		Total	100	
	Left	Normal	88	88
		Abnormal	12	12
		Total	100	
Uterine Artery RI	Right	Normal	85	85f
		Abnormal	15	15
		Total	100	
	Left	Normal	79	79
		Abnormal	21	21
		Total	100	
Umbilical Artery SD		Normal	85	85
		Abnormal	15	15
		Total	100	
Umbilical Artery RI		Normal	81	81
		Abnormal	19	19
		Total	100	
Uterine Artery ED notch		No	92	92
		Yes	8	8
		Total	100	

Uterine Artery doppler S/D Ratio: abnormal (Right 16%, Left 12%)
Uterine doppler Artery RI Ratio: abnormal (Right 15%, Left 21%)
Uterine doppler ED Notch: 8%
Umblicaldoppler Artery S/D Ratio: Abnormal 15%
Umblicaldoppler Artery RI Ratio: Abnormal 19%

Discussion
Type of delivery of this study group, there were 77 patients delivered vaginally and 23 cases delivered by LSCS including both elective and emergency.
Biometric findings of the study group, 46 cases having raised HC/AC and 52 cases having low FL/AC ratio stating increased risk of IUGR with sensitivity of 17.8% and specificity of 61.0% and sensitivity of 64.9% respectively as per shown in table 11 which is comparable to the study conducted in 2017 which were 70% sensitivity and 65% specificity and in similar study of OttWJ 2002 which were 85% sensitivity and 52% specificity respectively. Distribution of patients according to the gestational age at the time of delivery, average baby weight apgar score and NICU admission[6].

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The effect of biosocial and physiological factors of the study group. Parity, socioeconomic status and liquor status are insignificant to the IUGR. And NICU admissions, low birth weight having p value < 0.05 stating strong significance with incidence of IUGR.

Biometric parameters HC/AC and FL/AC ratios having p value < 0.05 showing strong significance with incidence of IUGR. Hence USG considered as good predictor of IUGR. Similar relevance found by Gangadhar P Y et al[7], North at al[8] and Bower et al[9].

Conclusion

Biometric indices of USG specially abdominal circumference and its relation with head circumference and femur length are also good indicators to predict IUGR. Uterine Doppler evaluation in the second or third trimester has been proposed as a screening tool for early onset IUGR especially associated with preeclampsia. Ultrasound biometry and Doppler velocimetry was performed on 100 clinically suspected cases for evaluation of IUGR pregnancy. The EFW was determined using standard biometric measurements and expressed as percentiles. Using color flow and pulse Doppler, resistance indices and systolic and diastolic ratio of uterine umbilical arteries were determined. Pregnancy outcome was ascertained by reviewing maternal and field charts. The statistical analysis system was used to analyze the data.

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