



Radiodiagnosis

UMBILICAL ARTERY DOPPLER VELOCIMETRY IN HIGH RISK PREGNANCY WITH RELATION TO OUTCOME IN A TERTIARY HOSPITAL: A DESCRIPTIVE STUDY

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ABSTRACT **BACKGROUND:** Umbilical artery Doppler plays major role in the fetal outcome in high risk pregnancy. The aim of this study was to study the umbilical artery Doppler velocimetry in predicting the fetal outcome in high risk pregnancy. **MATERIALS AND METHODS:** This is a prospective observational study. This was conducted in Department of Radiodiagnosis, Kannur Medical College, Kannur. It was conducted for the period of six months. A total of 50 antenatal cases were selected on the basis of inclusion and exclusion criteria. All the patients were explained the study procedure and informed consent was obtained. The selected patients were subjected to umbilical artery Doppler. The data was expressed in number and percentage. **RESULTS:** Patients with abnormal velocimetry had more number of caesarean section delivery compared normal velocimetry. The diagnosis to delivery interval, gestational age at delivery and average birth weight were comparatively lower with higher incidence of admission to neonatal intensive care unit in foetuses with abnormal umbilical artery Doppler velocimetry. **CONCLUSION:** Doppler velocimetry studies of umbilical artery can provide the clinical information regarding fetal wellbeing to help him improve fetal outcome.

KEYWORDS : Doppler, pregnant women, flow rate, velocimetry, umbilical artery, fetal

INTRODUCTION

The development of a good utero-placental circulation is important for achievement of a normal pregnancy. Intrauterine growth retardation (IUGR) is associated with an increased risk of perinatal mortality and morbidity.^{1,2} The correct diagnosis of the compromised IUGR fetus to allow for timely intervention is a main objective of antenatal care. The most common methods for evaluating health in foetuses identified as SGA are the biophysical profile (BPP) and the non-stress test (NST).^{3,4} These two tests are particularly sensitive for predicting poor outcome in IUGR pregnancies. In this condition Color Doppler comes to detect these abnormal vascular resistance patterns. The important issue is not the identification of small fetus, but rather the "fetus at risk" for compromise. Doppler assessment of the placental circulation plays an important role in screening for impaired placentation and its complications of pre-eclampsia, intrauterine growth restriction and perinatal death.^{5,6} Assessment of the fetal circulation is essential in the better understanding of the patho-physiology of a wide range of pathological pregnancies and their clinical management. Early screening for Preeclampsia may allow vigilant antenatal surveillance and appropriate timing of fetal delivery in order to avoid serious sequelae. Various hemodynamic and biochemical measures have been found to have limited accuracy as screening measures for this condition. The association between abnormal umbilical artery Doppler velocimetry and adverse pregnancy outcomes has been investigated widely. Many reports have shown a statistically significant relation between increased fetoplacental resistance, as estimated by either the resistance index or systolic-diastolic ratio (S/D), and the later development of either preeclampsia or fetal growth retardation (FGR).⁷ Despite these statistically significant correlations, the clinical utility of umbilical artery Doppler studies has been questioned because of its low predictive values for either preeclampsia or FGR and other adverse outcome in low risk population. In the present study, we determined whether umbilical artery Doppler velocimetry can predict perinatal outcomes in high risk pregnancies.

MATERIALS AND METHODS

Study settings and period: The study was conducted in Department of Radiodiagnosis, Kannur Medical College, Kannur. The study was conducted for six months during the period of June 2017 to December 2017

Inclusion criteria

- 28-42 weeks gestational age
- Who are willing to go for repeated scan
- Who are willing to give consent

Exclusion criteria

- Less than 28 weeks gestational age
- More than 42 weeks gestational age
- Vascular disorder patients

Procedure

The patients were selected on the basis of inclusion and exclusion criteria. They were selected randomly from patients coming to the Department of Radiodiagnosis, Kannur Medical College, Kannur during the study period. A total of 50 patients with high risk pregnancy admitted in hospital were included in this study. The selected patients were explained study procedure in their known language and informed consent was obtained. The patients were subjected to color Doppler analysis of umbilical artery.⁸

Statistical analysis

The data was expressed in number and percentage. Microsoft excel was used for the calculation.

RESULTS

A total 50 patients were included in this study. In that 30 showed normal Doppler and 20 had abnormal Doppler. The mean maternal age in normal Doppler was less than abnormal Doppler patients. 23 of normal Doppler cases and 13 of abnormal Doppler cases were primigravida, 7 of normal Doppler cases and 5 of abnormal Doppler cases were multigravida (Table-1). Mean S/D ratio was high in low end diastolic flow patients compared to others. 0.72 was RI in low end diastolic flow patients and was more compared to normal Doppler (Table-2). 7 in normal Doppler showed delivery at <36 weeks and 2 showed similar effect in low end-diastolic flow patients. NICU stay, diagnosis to delivery interval and APGAR <7 at 5 min showed different compared with normal Doppler with high risk pregnancy (Table-3)

DISCUSSION

The present study was done in high risk pregnancy, where Doppler helped us to predict fetal morbidity and mortality in the abnormal

umbilical artery group. Total 50 patients were included in the study. The study results showed significant changes comparing normal and high risk pregnancies. In the high risk also absent flow group showed significant difference in all observations compared to abnormal flow rate. Rochelson BL has observed that perinatal morbidity and mortality were significantly higher in small gestational age babies with abnormal umbilical artery Doppler⁹. The present study also showed similar type of observations. High risk pregnancy group showed changes in S/D and RI ratio of umbilical artery as weight increases. Fleischer et.al who evaluated that those fetuses with lower birth weight had higher placental vascular resistance than those with higher birth weight.¹⁰ The same pattern of results was observed in Malhotra study also. The NICU stay was more in low end diastolic pregnancy patients compared to others. Various studies showed similar type of results. This can be aggravated with any co-morbid conditions like diabetes, hypertension and anemia. The value of Doppler in assessment of high risk pregnancy has been studied by various authors worldwide. It has been proved that color Doppler plays an important role in the diagnosis of fetal outcome in pregnant women with high risk pregnancy.

CONCLUSION

From the results of present study we could conclude that the absent/reversed end diastolic flow as diagnosed by antenatal umbilical artery Doppler is associated with increased risk for poor perinatal outcome.

Table-1: Distribution of patients based on maternal history

Observation	Normal Doppler (n=30)	Abnormal Doppler (n=20)
Maternal age (Mean)	26.65	28.54
Parity		
Primigravida	23	13
Multigravida	7	5
Past history of SGA	1	1
Past history of PIH	1	1
Past history perinatal death	2	1

Table-2: Antenatal characteristics of study population

Observation	Normal Doppler (n=30)	Abnormal Doppler (n=20)	
		Low enddiastolic flow (n=18)	Absent/reverse diastolic flow (n=2)
S/D ratio (MEAN)	2.87	3.78	-
RI (MEAN)	0.64	0.72	-
PIH/Pre-eclampsia	27	12	2
Diabetes	-	1	-
Severe anemia	7	1	1
IUGR	6	8	1

Table-3: Neonatal outcome in study population

Observation	Normal Doppler (n=30)	Abnormal Doppler (n=20)	
		Low enddiastolic flow (n=18)	Absent/reverse diastolic flow (n=2)
Delivery at <36 weeks of gestation	7	2	1
Diagnosis to delivery interval	NA	8.45 days	<1 day
Average birth weight	2.56 Kg	2.34 Kg	1.56 kg
NICU stay	16	14	-
Average days stay in NICU	0.87 days	3 days	-
APGAR <7 at 5 min	4	3	2

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