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RESEARCH ARTICLE

THE EFFECTIVENESS OF DOPPLER STUDY IN MANAGEMENT OF HIGH RISK PREGNANCY"

***Dr. Payal H. Parmar**

Assistant Professor, Department of Obstetrics and Gynecology, Civil Hospital, B J Medical College, Ahmedabad

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ABSTRACT

Introduction: Doppler velocimetry is a rapid non invasive test that provides valuable information about the hemodynamic situation of the fetus. It is an efficient diagnostic test of fetal jeopardy and helps in the management of high risk pregnancy to reduce perinatal morbidity and mortality. The objective of study is to evaluate the utility of Doppler as a diagnostic tool in fetal surveillance and improved fetal outcome in high risk pregnancy. **Material and Methods**: 100 Antenatal women with high risk factors were selected on basis of History, clinical examination and investigations who came in OPD or referred from peripheral hospitals to Obstetrics and gynecology department, B J Medical College, Civil Hospital, Ahmedabad, between june 2017 to october 2019 and follow up taken upto Delivery. **Results:** there is positive correlation of umbilical artery doppler result with outcome of pregnancy. Increase chance of caesarean section and perinatal mortality, NICU admission and low birth weight baby is seen with abnormal umbilical artery doppler study population. **Conclusion:** our present study have clearly demonstrated the positive efficacy of Antenatal Doppler study in predicting the fetal outcome and antenatal surveillance.

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INTRODUCTION

Every newborn has the right to be born healthy. The fulfillment of this goal plays a pivotal role in feto-maternal medicine, whose sole objective is that every pregnancy should culminate into a healthy baby and a healthy mother. Doppler ultrasound represents an important screening and diagnostic tool in modern obstetrics. With the introduction of Doppler Ultrasound examination it became possible to assess the uteroplacental blood flow, feto placental blood flow and to assess the fetal blood circulation. The uteroplacental and fetoplacental circulation give information on the placental resistance whereas evaluating the fetal circulation using Doppler ultrasound could non-invasively assess the fetal response to hypoxia. This is become possible to identify those small fetuses that were at increased risk of perinatal morbidity and mortality due to impaired uteroplacental and fetoplacental circulations. Doppler ultrasound assessment of umbilical artery has become a standard of care of fetus with IUGR which helps to decrease perinatal mortality in high risk pregnancy. Doppler ultrasound of Middle Cerebral Artery has become the standard care for diagnosis of fetal anaemia, thus avoiding unnecessary invasive procedure. Doppler velocimetry is a rapid non invasive test that provides valuable information about the hemodynamic situation of the fetus. It is an efficient diagnostic test of fetal jeopardy and helps in the management of high risk pregnancy. To reduce perinatal morbidity and mortality of foetuses associated with high risk pregnancies their early detection and therapeutic intervention are important. Though the failure of fetus to attain or exceed its expected growth potential may result from numerous different pregnancy complications, the final common pathway most commonly is via uteroplacental insufficiency. Information available from Doppler ultrasound helps in managing pregnancy complicated by IUGR, fetal anemia and multiple gestation, diabetes mellitus, Posterm pregnancy .On the basis of abnormal Doppler results obstetrical decision making might improve and we can prevent Intra uterine death because hypoxic cerebral damage. There is significant association between the umbilical artery Doppler waveform analysis and clinical outcome.

MATERIAL AND METHODS

Study population consisted of 100 Pregnant women with high risk factors like PIH, IUGR, Oligohydramnios, anemia, twins and post date, etc were selected on basis of History, clinical examination and investigations who came in OPD or referred from peripheral hospitals to Obstetrics and gynecology department, B J Medical College, Civil Hospital,Ahmedabad, between june 2017 to october 2019 and follow up taken upto Delivery. Personal history, menstrual history, obstetrics

history as well as complaints of patients during antenatal period were noted in details. Routine investigations like Hemoglobin, Blood group, urine albumin were done in every patient. Specific investigations like serum uric acid, coagulation profile, Renal function tests, Liver function tests were performed. A fetal anatomy scan and a biometry were both performed for every patient before the Doppler examination. All women included in the study were subjected to umbilical artery Doppler measurements in addition to growth parameter, liquor and placental grading.

Observation and Analysis

The study group comprised of patients between the age group 17-35 years. The table shows that with increasing maternal age, need for Doppler evaluation and chances of abnormal Doppler study increases because with increasing age the high risk factors also increase.

Maximum number of Abnormal umbilical artery Doppler is in patients of PIH followed by IUGR followed by oligohydroamnios, anaemia and Twins. So it suggests that Pregnancy Induced Hypertension is the main responsible factor in feto-placental insufficiency. Increased incidence of Cesarean section is noted in cases with abnormal Umbilical Artery Doppler study and more incidence of normal delivery is noted in normal Umbilical Artery Doppler study. Table shows that mean gestational age and birth weight is comparatively low in abnormal doppler study group as compared to normal. The results of our study show that increased, incidence of caesarean section were found in patients with abnormal umbilical artery Doppler study. Also fetuses with abnormal umbilical artery velocimetry had early delivery at less than 36 weeks of gestation, increased NICU admission, low Apgar score than those with normal Doppler, increased incidence of perinatal mortality and still birth.

Table 1. Age distribution of patients

Age group (years)	No. Of Patients
< 20	7
21-25	26
25-30	27
>31	40

Table 2. Case distribution

Maternal condition	Total No. of Cases (100)	Umbilical artery Doppler		Middle cerebral artery doppler			Uterine artery doppler	
		Abnormal (40)	Normal (60)	CPR Ratio<1 (14)	Decresed S/d Ratio (20)	Normal (66)	Abnormal (10)	Normal (90)
PIH	40	15 (37.5) %	25	4 (28.57) %	5 (25) %	31	4	36
Oligohydroamnios	20	8 (20) %	12	5 (35.71) %	3(15) %	12	2	18
Polyhydroamnios	3	-	3	1 (7.14) %	-	2	-	3
IUGR	12	12 (30) %	-	-	4 (20) %	8	4	8
Anemia	7	2 (5) %	5	-	2 (10) %	5	-	7
Twins	5	3 (7.5) %	2	2 (14.28) %	1 (5) %	2	-	5
GDM	2	-	2	-	1 (5) %	1	-	2
Post date	6	-	6	1 (7.14) %	3 (15) %	2	-	6
Rh negative	5	-	5	1 (7.14) %	1 (5) %	3	-	5

Table 3. Labor outcome of study population (n=100)

Characteristics	Umbilical Artery (n=100)		MCA Artery Doppler (n=100)			Uterine Artery (n=100)	
	Abnormal (40)	Normal (60)	CPR Ratio <1(14)	< S/D Ratio (20)	Normal (66)	Abnormal (10)	Normal (90)
Normal delivery(62)	14 (35)%	48 (80)%	10 (71.42)%	14 (70) %	38 (57.57) %	5 (50)%	57 (63.33)%
Cesarean section (38)	26 (65)%	12 (20)%	4 (28.57)%	6 (30) %	28 (57.57) %	5 (50)%	33 (36.66)%

Table 4. Doppler characteristics in abnormal Umbilical artery Doppler and normal Uterine artery Doppler

Characteristics	Abnormal Umbilical artery Doppler(40)	Normal Umbilical artery Doppler(60)	Abnormal MCA artery Doppler(34)	Normal MCA artery Doppler(66)	Abnormal Uterine artery Doppler(10)	Normal Uterine artery Doppler(90)
Pulsatility Index	1.52 ± 0.18	0.83 ± 0.12	1.08 ± 0.26	1.28 ± 0.23	0.97 ±0.38	0.59±0.12
Resistance Index	0.76 ± 0.08	0.5 ± 0.09	0.66 ± 0.07	0.74 ± 0.19	0.58±0.17	0.43 ±0.06
S/D ratio	4.46 ± 0.76	2.73 ± 0.24	2.93 ± 1.03	3.93 ± 0.94	1.82±0.59	1.55±0.26

Table 5. Study of mean Gestational age at delivery and birth weight in Abnormal and normal study group

Characteristics	Abnormal Umbilical artery Doppler(40)	Normal Umbilical artery Doppler(60)	Abnormal MCA doppler (36)	Normal MCA artery Doppler(64)	Abnormal Uterine artery Doppler(10)	Normal Uterine artery Doppler(90)
Gestational age at delivery (weeks)	33.8 ± 2.1	37.1 ± 1.9	34.8 ± 2.2	36.1 ± 1.9	34.8 ± 2.2	36.1 ± 1.9
Birth weight (gms)	1700 ± 350	2200 ± 550	2000 ±350	2400 ± 550	1900 ± 350	2300 ± 550

Table 6. Comparative Study of neonatal outcome in Umbilical, MCA and Uterine artery Doppler study

Characteristics	Umbilical artery Doppler				MCA artery Doppler			Uterine artery	
	Normal (60)	Reduced EDF (22)	Absent EDF (8)	Reverse EDF (10)	CPR Ratio <1 (14)	Decreased S/D Ratio (20)	Normal (66)	Abnormal Doppler (10)	Normal Doppler (90)
Delivery <36 weeks	20	13	6	9	9	10	29	8	85
Live/still birth/PNM	56/0/4	11/1/10	4/0/4	2/1/7	10/1/3	15/1/4	48/0/18	9/0/1	64/2/24
Birth weight	2.1+0.55	1.75+0.33	1.55+0.7	1.33+0.6	2±350	1.90 ±0.45	2.4±0.55	2.1+0.55	2.4+0.33
Apgar<6	4	8	5	8	4	6	10	1	28
NICU admission	7	13	5	8	4	8	21	1	32
Neonatal death	4	10	4	7	3	4	18	1	24
Discharge in good condition	56	11	4	2	10	15	48	9	64

In abnormal umbilical artery Doppler more chances of worse prognosis is seen in case of reversed diastolic flow as compare to reduced and absent end diastolic flow. Fetuses with abnormal MCA artery velocimetry had early delivery at less than 36 weeks of gestation, increased NICU admission, low Apgar score than those with normal Doppler, increased incidence of perinatal mortality and still birth. In abnormal umbilical artery Doppler more chances of worse prognosis is seen in case of decreased S/D Ratio as compare to < CPR Ratio.

RESULTS

There was a significant decrease in PI of Umbilical artery Doppler study as birth weight increases, the birth weight is higher in the normal Umbilical artery Doppler and lowest in the reduced/absent/ reversed end diastolic flow group. And birth weight is low in decrease CPR Ratio and decrease S/D ratio as compare to normal MCA artery Doppler. Increased incidence of Cesarean section is noted in cases with abnormal Artery Doppler study and more incidence of normal delivery is noted in normal Artery Doppler study. Perinatal mortality was highest in the absent and reversed end diastolic flow Patient. Various studies also suggest that in the most extreme waveform abnormality, there is REDF or AEDF which is considered a very ominous sign of placental compromise and is .associated with high perinatal mortality rates.

CONCLUSION

Doppler velocimetry offers possibility to evaluate the hemodynamics on both sides of placenta and fetal vessels. The method has been applied successfully in patients with various complications of pregnancy especially PIH, oligohyramnios and IUGR. The perinatal mortality increases with abnormality of the fetal Doppler. It is generally accepted that the finding of AEDF/REDF in umbilical artery is a reliable sign of imminent fetal asphyxia and that such findings should indicate an intervention even in case where cardiotocography is still normal. Thus from the number of studies, Doppler velocimetry of umbilical and fetal arteries are useful diagnostic test for fetal jeopardy, IUGR, increased perinatal mortality, fetal distress acidosis, law Apgar score and increased LSCS. And we can predict 80% of adverse neonatal outcome by the color Doppler. During the recent years, several studies have been published on Doppler velocimetry incorporated in the clinical management of IUGR. The studies showed that the use of Doppler has a positive impact on outcome of pregnancies.

In the modern era of obstetrics practice, both maternal and fetal outcome are important. In earlier practice when Doppler was not in use, maternal outcome irrespective of the fetal outcome was given the utmost value.

Currently the scenario has changed. Whenever the obstetrician is in dark regarding the fetal outcome Doppler has helped in predicting and managing the high risk cases. Doppler should be used as a routine investigation as a part of antenatal surveillance in high risk cases like PIH, IUGR and oligohydramnios. Serial Doppler studies should be done to detect the efficacy of medical management given to these patients and more frequently when required to detect improving or deteriorating trend and timely obstetrics intervention in fetal interest. Thus, the results of our present study have clearly demonstrated the positive efficacy of Antenatal Doppler study in predicting the fetal outcome and antenatal surveillance.

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