ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

ROLE OF PANVESSEL DOPPLER STUDY IN HIGH RISK PREGNANCY

KEY WORDS: high risk pregnancy, panvessel color Doppler, perinatal outcome

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ABSTRACT

Doppler velocimetry is a rapid non-invasive test that provides valuable information about hemodynamic situation of the fetus and is an efficient diagnostic test of fetal jeopardy that helps in management of high risk pregnancy. The velocity waveforms are categorized by a low diastolic flow, diastolic notch, biphasic declaration slope and elevated indices. The presence of a notch after 26 weeks is a bad indicator leading to hypertensive and IUGR complications Persistence of a notch after 26 weeks indicates vasospasm. **Objective(s):** To evaluate the role of panvessel (umbilical, middle cerebral and uterine artery) color Doppler study in normal and high risk pregnancy in relation to perinatal outcome. **Method(s):** A prospective case-control study was done including 50 women with high risk pregnancy and 50 normal pregnant women during the year Oct 2019-Oct 2020. Doppler examination was done after recording patients' history, clinical examination and ultrasound. Mode of delivery, perinatal outcome including birth weight, perinatal death, Apgar score at 1 and 5 minutes and admission to nursery were compared. **Result(s):** The high risk group were PIH (22%), IUGR (18%), PIH+IUGR (14%), BOH (10%), APH (10%), Rh negative pregnancy (8%), Diabetes (6%), IUGR+Rh negative pregnancy (4%), IUGR+Anemia (4%), IUGR+BOH (2%), PIH+IUGR+BOH (2%). The most common high risk group found in study group was PIH (38%). 59% cases were between gestational age 38-42 weeks. In our study out of 11 patients of PIH, 8 cases have uterine artery notch, 8 cases have umbilical artery S/D ratio>3. **Conclusion(s):** Panvessel color Doppler sonography is very useful in high risk pregnancy diagnosis and in predicting perinatal outcome.

INTRODUCTION

Doppler velocimetry is a rapid noninvasive test that provides valuable information about hemodynamic situation of the fetus and is an efficient diagnostic test of fetal jeopardy which helps in timely intervention and management of high risk pregnancy for better perinatal outcome.

The assessment of the umbilical blood flow by Doppler Ultrasonography provides information of blood perfusion in the feto-placental unit. Abnormal uteroplacental and fetoplacental blood flow adversely affect intrauterine growth and increase the risk for brain injury. Hence Doppler Ultrasonography has become an important tool for screening and detection of significant high risk pregnancy group and hence fetal outcome of pregnancy.

A Doppler Ultrasonography of umbilical arteries helps in monitoring of compromised fetus and also predicts neonatal morbidity and optimal time of delivery in complicated or high risk pregnancies. A meta analysis of randomized controlled trials of umbilical artery Doppler velocimetry in high risk pregnancies demonstrated that its use was associated with trend towards reduction of perinatal morality.

All pregnancies and deliveries are potentially are at risk. A pregnancy is said to be normal only in retrospect i.e. only when the mother goes safely through pregnancy, labor and puerperium with a healthy baby.

However, there are certain categories of pregnancies where the mother, the fetus or the neonate is in state of increased jeopardy. About 20-30 % of the pregnancies belong to this category. To improve the obstetric result, this group must be identified & given extra care. Even with the adequate antenatal & intranatal care, this small group is responsible for 70-80% of perinatal mortality and morbidity.

Uterine artery Doppler has more of predictive value for IUGR and PRE-ECLAMPSIA. Early diastolic notching and reduced or absent diastolic flow is normal in first trimester. But endovascular trophoblastic invasion of spiral arteries leads to decrease in placental vascular resistance, so after 16 wks of gestation there is progressive increase in diastolic flow throughout gestation. So PI, RI and S/D ratio remain low. Early diastolic notch should disappear by 25th wk of gestation. Abnormal Umbilical artery doppler reveals information about fetal side while abnormal uterine artery Doppler tells about maternal side.

Defective trophoblastic invasion leads to increase in RI, PI values. Presence of notch (decreased velocity in early diastole) is documented. If present then whether it is unilateral or bilateral, Simultaneous presence of intrasystolic notch reflects extremely high impedance.

MATERIAL AND METHOD

This prospective case control study was carried out in the department of Obstetrics and Gynecology (Janana Hospital), JLN Medical College, Ajmer in 100 pregnant women attending OPD /admitted and the inclusion and exclusion criteria during the period October 2019 to October 2020.

STUDY SUBJECTS

Women with inclusion criteria admitted /attending to department of obstetrics and gynaecology was assigned into two groups A and B. Each group was contain study subjects in the ratio of 1:1, Group A was contain control subjects (normal pregnancies) and group B was contain pregnant women with high risk pregnancies with inclusion criteria.

INCLUSION CRITERIA:

These women may be booked, unbooked or referred as high risk cases from other hospital. Women with >28 weeks

gestation, who were sure of their last menstrual period, calculated by Naegle's formula and/or confirmed by atleast one first trimester ultrasound. Detailed history and General Physical Examination and Obs examination of patients with laboratory investigations and ultrasonography with color doppler were studied. Patients with singleton pregnancies associated with hypertensive pregnancies, intrauterine growth restriction, bad obstetric history, Rh negative pregnancy, anemia, thyroid disorder and diabetes mellitus.

EXCLUSION CRITERIA:

Cardiovascular disease, Multiple gestations, Fetuses with congenital anomalies, Renal disease, Essential hypertension prior to pregnancy

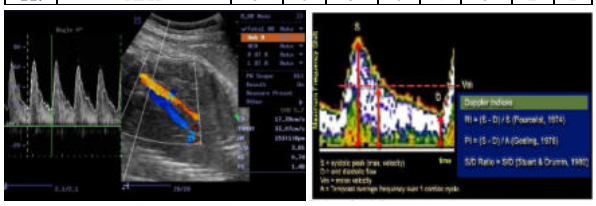
METHOD OF COLLECTION OF DATA

All the high risk pregnancies with inclusion criteria and equal number of normal pregnancies was subjected to Doppler examination after recording the clinical history of the patients, clinical examination and ultrasound. Doppler wave forms were obtained for umbilical, uterine & middle cerebral arteries and various indices will calculated viz., Pulsatality Index(PI), Resistance Index(RI), S/D ratio.

RESULT

DOPPLER IN DIFFERENT CATEGORIES OF CASES

S. No.	Categories (High risk)	No. of Cases	Diastolic Notch in Uterine Artery	Umbilical Artery S/D>3	Abnormal MCA PI	Low Apgar(<7)	LBW Babies (<250 gm)	Nursery Admission	Neonatal Deaths
1.	PIH	11	8	8	8	6	1	5	0
2.	IUGR	9	6	8	9	6	8	4	0
3.	PIH+IUGR	7	7	7	7	5	7	6	2
4.	Diabetes	3	0	3	0	2	1	2	0
5.	IUGR+Rh Negative	2	2	2	1	0	0	0	0
6.	PIH+IUGR+BOH	1	1	1	1	1	1	1	0
7.	IUGR+BOH	1	1	1	0	0	0	0	0
8.	IUGR+Anemia	2	2	2	1	2	2	1	0
9.	BOH	5	0	3	1	1	0	0	0
10.	Rh Negative	4	0	3	0	1	1	1	0
11.	APH	5	0	3	0	4	5	2	1



UMBILICAL ARTERIAL AND VENOUS FLOW

DISCUSSION-

The most common high risk group in the study group was PIH (38%) either alone (22%) or in combination with other risk factor like IUGR and BOH (16%). The second most common high risk group was IUGR either alone (18%) or in combination with PIH, BOH anemia and Rh negative pregnancy (26%). The other high risk group includes BOH (10%) alone and along with other risk group like IUGR and PIH 4%, APH (10%) and diabetes (6%).

P. Komuhangi et al studied 192 patients out of which one hindered and seventy four (90%) of the mothers had hypertension in pregnancy. 14 (7%) had IUGR without hypertension while 8 had IUGR with hypertension and 4 (2%) had Diabetes Mellitus.

Dr. Latika Mehta et al studied 100 high risk pregnant patients of which 60 cases were PIH, 18 cases were post-dated, 13 cases were oligophdraminos, 3 cases were diabetic and 3 cases were placental prevail. The most common risk factor found was PIH.

In our study PI, RI, S/D ratio of high risk group were 1.84. 0.74, 3.84 and that of control group were 0.84, 0.56, and 2.15 receptively. Umbilical artery Doppler indices of high risk group were significantly higher than control group.

P. Komuhangi et al studied resistance indices of 150 patients. The resistance indices ranged from 0.21 to 0.88. Thirty-two of the 34 (94%) fetuses with high umbilical artery resistance indices were of hypertensive mothers. Foetuses delivered at 28-36 weeks were 3 times more likely than those delivered at 37-42 weeks to have had a high umbilical artery resistance index. OR 3.17 (CI 1.40 – 7.17) P=0.00. This was statistically significant.

Malik Rajesh et al studied 100 cases In their study, in the high-risk group with abnormal umbilical artery Doppler indices (60 cases), 31 cases had reduced end diastolic flow in umbilical artery flow inumbillical artery flow velocity waveforms, out of whom 26 cases (83.87%) had abnormal fetal outcome. Absent end diastolic flow was present in 13 cases, and 2 cases had reversed end diastolic flow.

In the present study, there were three neonatal deaths in the study group while none of the neonates died in the control group thus indicating poor perinatal outcome in the high risk group associated with abnormal Doppler findings.

Kondareddy Narasappagari Srilakshmiet al studied 50 women of high risk pregnancy. Of the 50 neonates, 19 neonates were admitted to NICU, 8 neonates had 5 min Apgar score of less than 7 and 15 babies was born by emergency caesarean section for fetal distress. There were 8 neonatal deaths. Of the 8 neonatal deaths, 1 case had reversal of diastolic flow and 5 had absent diastolic flow.

In our study main cause of neonatal death was found to be Respiratory distress and Septicemia.

Relative risks associated with IUGR using morbidity and mortality paramenters, from the study by **Bernstein et al**, are as follows:

Relative risk of death, 2.77; 95% confidence interval (CI), 2.31-3.33

Relative risk of respiratory distress syndrome, 1.19; 95%CL, 1.03-1.29

Relative risk of intraventricular hemorrhage, 1.13; 95%CL, 0.99-1.29

Relative risk of necrotizing enter colitis, 1.27; 95%CL, 1.05-1.53

SUMMARY AND CONCLUSION-

The foregoing study was conducted to assess the perinatal outcome by the Doppler sonographic examination of the umbilical, uterine and middle cerebral artery in high risk pregnancy.

We conclude that Doppler ultrasound evaluation reflects fetal hemodynamic adequately. The results of our study support the use of Doppler umbilical, middle cerebral, uterine waveform analysis as an important fetal well being investigation, which though not necessarily diagnostic has a lot of prognostic value. Thus in consolation with obstetrician, neonatologist, the timing and mode of delivery can be decided upon the Doppler studies to improve perinatal outcome in high risk cases.

The derived statistical data including sensitivity and P value correlate well with the previous studies thus testifying this hypothesis to be positive. Hence, Doppler ultrasound should be an integral component of the routine evolution of high risk groups, playing a decision making role in obstetrical surveillance and management.

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