

Doppler Surveillance of High Risk Pregnancies: a Comparative Study at Tertiary Care Centre

* ¹Dr.R.Rama, ²Dr Eda.Indira, ³Dr B.Srinivas Rao

Assistant professors, departement of obg siddhartha medical college, dr.ntr uhs, vijayawada, andhra pradesh

*Corresponding author: ²Dr EDA.Indira

Abstract

BACK GROUND:

Doppler velocimetry is important diagnostic tool in the management of high risk pregnancy incidence of high risk pregnancy is 20-30% this group must be identified and given extra care. This small group is responsible for 70-80% of perinatal mortality and morbidity. The present study aims at the effectiveness of Doppler velocimetry of umbilical artery and fetal vessels to improve fetal out come in high risk pregnancies

AIM OF THE STUDY

To study the acceptability, efficacy of doppler ultrasound in high risk pregnancies and reducing the perinatal mortality and morbidity.

MATERIALS AND METHODS:

It is a prospective observational study. This study was conducted from January 2016 to Dec 2018 in OBG department of SMC Vijayawada and it was approved by the ethical committee ,informed consent was taken from all the patients .A total of 200 high-risk pregnant women with gestational age 30 weeks and above were selected for the study and divided into group A (100) subjected to Doppler velocimetry and group B [100] without doppler velocimetry. Standard management protocols were followed in all cases. The primary outcome measures were mode of delivery and gestational age at the time of delivery. The secondary outcome measures were perinatal and neonatal complications.

RESULTS:

Preterm deliveries, preterm as well as full-term neonatal admissions were more frequent in group A than those in group B (39% vs 26%) (22% vs 20%) (18% vs 10%) . But preterm and full-term neonatal deaths were less in group A than those in group B (3% vs 18%)

CONCLUSION:

Surveillance of high risk pregnancies with Doppler velocimetry compliments the biophysical methods of fetal surveillance to determine earlier and more precisely the fetal compromise and aids in the appropriate timing of delivery and there by perinatal outcome was improved.

Key Words : Doppler Ultra sonography, high risk pregnancy, perinatal mortality

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I. Introduction

The majority of adverse perinatal outcomes in developing countries are placental-associated diseases and it is confirmed that uterine artery Doppler evaluation predicts most occurrences of early-onset preeclampsia and intrauterine growth restriction. The significance of Doppler ultrasound in evaluating pregnancies that have the risk for preeclampsia, intrauterine growth restriction, fetal anaemia, and umbilical cord abnormalities has become indispensable. Doppler velocimetry of middle cerebral artery in combination with umbilical artery seems to improve prediction of adverse outcome in near-term pregnancies. Ductus venosus Doppler is useful in timing delivery of pre-term IUGR⁴.

Doppler wave form studies of uterine arteries provide information about maternal circulation useful in early pregnancy screening for preeclampsia and IUGR. Fetal umbilical artery gives information about placental vascular resistance elevated systolic/diastolic (S/D)ratio,the resistance index and the pulsatility index indicate increased blood flow resistance and decrease in end diastolic velocity these are associated with FGR and intrauterine hypoxia. . Fetal middle cerebral artery also provides information regarding fetal adaptation .In IUGR MCA Doppler shows Cerebro placental ratio <1 was taken as abnormal .In Rh -ve pregnancy serial doppler study of Fetal middle cerebral artery(MCA) – peak systolic velocity is the main stay to assess fetal anaemia. A value of >1.5 multiples of median (MoM's) for the corresponding gestational age predicts moderate to severe anaemia¹. Fetal venous circulation assesses fetal cardiac function³.

Doppler was considered as abnormal when there was reduced or absent or reverse diastolic flow in umbilical artery S/D ratio above the 95th percentile for gestational age.. On the basis of abnormal Doppler results, obstetrical decision making might improve and prevent intrauterine death because hypoxic cerebral damage may begin before labour and intrapartum asphyxia is probably more damaging when superimposed on underlying hypoxia ² .

In Multiple pregnancy with monozygotic twins complication like twin to twin transfusion or twin reversed arterial perfusion ,the intraplacental communications leading to vascular shunting is assessed with Doppler ultrasound. In suspected renal agenesis with severe oligomanios, colour Doppler helps to identify the presence or absence of renal agenesis.

This study was designed to compare the efficacy of Doppler ultrasound in high-risk pregnancies in improving the perinatal and neonatal outcome.

II. Materials And Methods

2.1 Study design – Prospective observational study

2.2 Study population – Women with high risk pregnancy 30 wks and above from both out patient, inpatient department of OBG Government General Hospital Vijayawada

Study period – Jan 2016 – Dec 2018

2.3 Inclusion criteria - . Women with viable singleton pregnancy with regular antenatal visits and gestational age 30 or more weeks were included. high-risk pregnancy, e.g., with diabetes, multiple pregnancies, Rh –ve pregnancy, high blood pressure, kidney disease, epilepsy, past history of three or more miscarriages, preterm delivery, preeclampsia or seizures, heart valve problems, asthma, and rheumatoid arthritis, were included.

2.4 Exclusion criteria – Nil.

This study was conducted from January 2016 to Dec 2018 in OBG department of SMC Vijayawada, tertiary care center where high risk pregnancies were more. A total of 200 high-risk pregnancy women were selected for the study .And divided into group A to have Doppler ultrasound and group B not to have. The subjects of group A were subjected to receive Doppler studies at the time of first visit followed by subsequent examinations depending upon the initial Doppler findings. Doppler studies were done on umbilical cord was located in pool of amniotic fluid and values were taken at mid cord or placental insertion. Middle cerebral artery was localized in transverse section of fetal skull, at the level of thalamus in the Sylvain fissure. The ratio of peak systolic to least diastolic, PI & RI were calculated from wave forms obtained from umbilical artery and middle cerebral artery ⁶ .

If the patient was randomized to group A and Doppler was normal, no intervention was done according to the protocol. The examination was repeated weekly according to gestational age. If the resistance index was abnormal indicating possible fetal problem, management was done accordingly by considering the standard hospital guidelines and protocols. Group B which was Doppler not done for them must be managed according to high-risk clinical problems and our standard protocol. Sonar and fetal heart rate monitoring was available to all patients. The data was analysed by using SPSS version 24.

III. Results

Table 1

Socio-demographic data

Variables	Group A	Group B
Age in years		
<25	16 (16%)	18 (18%)
25 – 30	19 (19%)	17 (17%)
30 - 35	48 (48%)	50 (50%)
>35	75 (75%)	15 (15%)
Parity		
primipara	25 (25%)	32 (32%)
multipara	75 (75%)	68 (68%)
Socio economic status		
High	8 (8%)	6 (6%)
Middle	62 (62%)	66 (66%)
Low	30 (30%)	28 (28%)

Majority of subjects in our study are between age 30 and 35. 48% in group A 50% in group B

Table 2

Distribution of risk Factors

Variables	Group A	Group B
Maternal hyper tension	62 (62%)	50 (50%)
Diabetes	25 (25%)	20 (20%)
Renal disease	10 (10%)	10 (10%)
BOH	60 (60%)	50 (50%)
IUGR	46 (46%)	44 (44%)
Oligoamnios	36 (36%)	38 (38%)
Consanguinity	22 (22%)	24 (24%)

Majority of subjects in our study had Hypertension as Risk Factor 62% in group A 50% in group B

Table 3

Primary outcome measures

Variables	Group A N-100	Group B N-100
Mode of delivery		
Spontaneous	8 (8%)	10 (10%)
Induced	22 (22%)	16 (16%)
C- section	76 (76%)	74 (74%)
Gestational Age at the time of delivery		
Pre- term	39 (39%)	26 (26%)
Term	61 (61%)	74 (74%)

Incidence of C- section pre- term deliveries and labour induction was high in Group A than Group B (76% VS 74% & 39% VS 26% & 22% VS 16%) respectively

Table 4

Perinatal outcome

VARIABLES	GROUP A	GROUP B
Neonatal weight in kgs {mean+sd}	2.7±0.8	2.9±0.6
APGAR SCORE		
At 1min <7	20 (20%)	41 (41%)
At 5 min <7	6 (6%)	13 (13%)
NICU admission	40 (40%)	30 (30%)
Preterm	22 (22%)	20 (20%)
TERM	18 (18%)	10 (10%)
Duration of stay in NICU	12.7± 3.2	16±4.1
Perinatal mortality	3 (3%)	18 (18%)
Still births	0	2

The APGAR score <7 at 1 and 5 minutes was less frequent in group A than in group B (20% vs. 41%), and (6% vs. 13%) respectively.

Neonatal admission to NICU as well as mortality, morbidity was higher in subjects in group A with abnormal Doppler USG findings than those with normal Doppler findings.

NICU admissions were more in group A than in group B 40% VS 30% but duration of stay and perinatal mortality was less in group A than group B (12.7 ± 3.2 vs 16 ± 4.1) (3% vs 18%) respectively the p values is (<0.05) which is statistically significant.

IV. Discussion

The results of this study have confirmed that normal Doppler waveforms recorded during the third trimester are associated with good pregnancy outcome. However, certain effects on obstetric management were observed, introduction of this test into regular clinical practice reduce neonatal morbidity and mortality. Trudinger et al. Randomized 300 high risk pregnant women into two groups, i.e. A group for antenatal Doppler umbilical artery waveform studies and a control group, and found no difference in the rates for elective delivery [induced or spontaneous] emergency caesarean section was more frequent in the control group (23%) than those in the report group (13%). Fetal distress in labor was also more common in the control group. Babies from the control group spent longer in NICU and needed more respiratory support than did those in the report group The findings indicated that the availability of Doppler studies leads to better obstetrical decision making.

In our study Caesarean section were less frequent in group B, suggesting that Doppler results had identified those foetuses which would not tolerate labor; and, a corresponding increase in caesarean sections were observed in those who had shown abnormal Doppler studies in group A. Moreover, this study revealed a high rate of preterm deliveries in group A than that in group B, suggesting that Doppler Velocimetry can often distinguish between the small fetus that can safely be managed conservatively from the

fetus at high risk of developing fetal distress or perinatal death who is likely to get benefit from earlier delivery³.

NICU admission rates were more in group A than but the neonatal deaths of pre-and full-term babies admitted to NICU were significantly higher in the group B than those in the group A. In group A the percentage of neonatal deaths in babies with abnormal Doppler waveform were more than normal Doppler observed. Our study found as increased number of preterm births, obstetric interventions, and improved perinatal outcome from the use of Doppler waveform analysis in late pregnancy. With the identification of fetuses at risk of placental diseases and growth retardation especially in earlier pregnancy, directing the therapeutic applications for improving fetal growth and development, Doppler technology might be more likely to make a worthy and outstanding contribution.

Mc Parland and Pearce described in a review article the results of a study of 509 pregnancies in which patients were stratified into "concealed" or revealed " groups according to whether the waveforms were normal or abnormal . Fewer neonatal deaths were observed in the "revealed" group although further details were not provided. In a randomized comparison of routine versus highly selective Doppler waveform and biophysical profile usage, Tyrell et al. observed fewer depressed babies at fifth minute APGAR scores and less neonatal morbidity in the routinely monitored group.

According to systemic review by Imdad et al., the effectiveness of Doppler velocimetry of umbilical and fetal arteries in "high-risk" pregnancies, together with the appropriate intervention, reduced peritoneal mortality by 29%.on the other hand impact on stillbirth showed a reduction of 35%:

Qahtani in her review article mentioned and that the clinical action guided by Doppler ultrasonography of UA reduced the probability of prenatal deaths by 38% in high risk pregnancies .

V. Conclusion

By doing Doppler velocimetry of umbilical artery and fetal vessels in fetal surveillance of high risk pregnancies reduces perinatal mortality by 15%

Surveillance of high risk pregnancies with Doppler velocimetry compliments the biophysical methods of fetal surveillance to determine earlier and more precisely the degree of fetal compromise and aids in deciding the appropriate timing of delivery and there by perinatal outcome was improved.

Refereneces

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