

Role of doppler velocimetry in fetomaternal surveillance of pregnancy with pre-eclampsia

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Abstract

Objectives: The aim of the study is to evaluate the role of doppler in predicting foetal outcome in patients with pre-eclampsia. **Materials and Methods:** Result: The study was carried out in the department of Obstetrics and Gynaecology, JLNLMCH Bhagalpur, over a period of two years on 100 women with clinical diagnosis of Pre-eclampsia. Colour Doppler study was done between 24 to 36 wks of gestational age. Both second trimester and third trimester Doppler velocimetry of uterine artery, umbilical artery and middle cerebral artery was done and results of S/D ratio, PI, RI, absent or reversed diastolic flow was correlated with foetal outcome. Out of 100 patients studied in third trimester uterine artery doppler showed 76% with persistent diastolic notch, 88% with elevated S/D ratio, 89% had elevated RI and 85% with elevated PI. Umbilical artery Doppler at third trimester reveals 90% with elevated S/D ratio, 85% with elevated PI. Reversal or absence of end diastolic velocity in 23%. Doppler velocimetry of MCA showed decreased PI in 15% of patients. **Conclusion:** Doppler velocimetry of uterine artery, Umbilical artery and Middle cerebral artery in patients of pre-eclampsia gives prognosis of foetal outcome. It helps to guide Gynaecologists to take timely action and plan correct treatment.

Key Word: S/D ratio- systolic flow / diastolic flow ratio PI- Pulsatility Index, R/I- Resistivity index.

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INTRODUCTION

Gestational hypertension is defined as hypertension with BP > 140/90 mm of Hg. on two occasions at least 6 hrs apart after 20th week of gestation in women known to be normotensive before pregnancy and before 20 weeks of gestation. When this hypertension is associated with proteinuria, it is known as Pre-eclampsia. Most common cause of Pre- eclampsia is abnormal placentation. It is one of the initial events. Abnormal placentation are

inadequate trophoblastic invasion of the maternal spiral arterioles and accelerated apoptosis of the trophoblast with abundant release of fetal DNA into the maternal circulation. This deficiency results in decreased uteroplacental perfusion. This is responsible for perinatal morbidity and mortality mainly due to its effect on the growing foetus. Doppler studies and especially colour Doppler with spectral evaluation has provided the right tool in forewarning the obstetricians about the impending problem which could become a disaster if not properly managed. The aim of the study is to evaluate the role of doppler in predicting foetal outcome in patients with pre eclampsia.

MATERIALS AND METHODS

This study was carried out in the Department of Obstetrics and Gynaecology, JLNLMCH, Bhagalpur over a period of 2 years from Jan 2017 – Dec 2018. 100 women with clinical diagnosis of pre- eclampsia were evaluated for chronological scan targeted study. AFI (Amniotic fluid index), EFW (Effective foetal weight) status of

foetus is assessed. Colour Doppler study was done between 24 to 36 weeks of gestational age over a period of 4 years. The findings at the time of first examination were taken into consideration. Repeat Doppler studies were performed whenever required. Doppler velocity wave form analysis of umbilical, uterine and foetal middle cerebral artery was obtained using 3-5 MHz curvilinear transducer. The uterine Artery was studied by first identifying the placental site. If the placenta was unilateral, uterine artery of that side was studied. In case of central placenta, both uterine arteries were evaluated. Free floating loop of umbilical cord was examined to evaluate umbilical artery. The flow velocity wave forms were computed automatically, the average value of three such recording was obtained. The data regarding perinatal outcome was collected which included birth weight, number of foetal and perinatal deaths, admission in NICU, number of days in NICU and mode of delivery. S/D ratio of greater than 3 and 2.6 in umbilical and uterine arteries respectively were considered abnormal. Absent end diastolic velocity (AEDV), reversed end diastolic velocity (REDV) and persistent early diastolic notch in uterine artery were considered abnormal. Compensatory increase in diastolic flow in foetal Middle Cerebral artery (MCA) suggested brain sparing effect seen in asymmetric IUGR.

RESULTS:

Table 1: Table showing age of patients in present study.

Age(yrs)	No. Of Patients	% age.
<20	36	36%
21-25	32	32%
26-30	25	25%
31-35	07	07%

Table 2: Location of placenta in pre eclampsia. (n-200)

	Fundal	Lateral
No. Of cases	18 (18%)	82 (82%)

Table 3: Doppler analysis of pre eclampsia. (n-100)

Normal Doppler in pre eclampsia	08 (8%)
Abnormal Doppler in pre eclampsia	92 (92%)

Table 4: Table showing foetal outcome in present study.

Pre-term deliveries	42	42%
Perinatal Death	13	13%
Low Birth weight (LBW)	35	35%
Foetal Distress	10	10%
Total	100	100%

Uterine artery: In 2nd trimester Doppler study of uterine artery was performed on 100 pts. Early diastolic notch was seen in 76 pts (76%). Elevated S/D ratio was noted in 88 pts. 89 (89%) had elevated RI and 80 pts (80%) had elevated PI. 12 pts (12%) had normal Doppler

velocimetry. In 3rd trimester study 82 pts (82%) had persistent diastolic notch in uterine arteries, 20pts (10%) did not show. 91 pts (91%) had elevated S/D ratio, 12 pts did not reveal any elevation. RI was elevated in 82 pts (82%), in 11% RI was normal. Elevated PI was noted in 184 pts (81%) and was normal in 15 pts (8%).

Umbilical Artery: 2nd trimester Doppler study of umbilical artery reveals 58 pts (58%) with elevated S/D ratio and 32pts (32%) had normal S/D ratio. Elevated PI index was noted in 76 Pts (76%) and rest 24 pts had normal S/D ratio and absence or reversal of end diastolic flow was not detected. 3rd trimester Doppler of umbilical artery in 100pts showed elevated S/D ratio in 95 pts (95%) and normal in 05 pts (5%). PI was elevated in 93 pts (93%) and normal in 7 pts. Reversal or absence of end diastolic velocity was noted in 32 pts (32%) and not present in 68 pts (68%).

Middle cerebral artery: Middle cerebral artery Doppler study was done in 2nd trimester as well which was normal. MCA, PI was decreased in 18 pts (18%) and was normal in rest of the patients.

DISCUSSION

The present study comprised of 100 pts and among these maximum no of patients were in the age group < 20 yrs. Most patients in present study were multiparous and oedema was present in some of them. Our findings of Doppler of uterine, umbilical and MCA study in 2nd trimester are consistent with Battaglia *et al* findings. Our findings in 3rd trimester doppler velocimetry showed decreased PI in 18% of patients indicating presence of decreased impedance to cerebral circulations. Such fetuses are at high risk of poor perinatal outcome. Out of 100 pts studied in 3rd trimester uterine artery Doppler showed 82% had persistent diastolic notch, 89% had elevated S/D ratio, 82% had elevated RI and 81% with elevated PI. This is consistent with the findings of Fleischer *et al* i.e. 80%, 93%, 85% and 90% respectively. Umbilical artery Doppler at 3rd trimester reveals 93% with elevated PI reversal or absence of end diastolic velocity in 32%. These findings are consistent with Bataglia and Schulman *et al*³ findings i.e. 87%, 91% and 17% respectively. Similarly foetal outcome in the study is preterm deliveries 42%, perinatal death 13%, low birth weight 35%, foetal distress 10% that correlated well with other studies.

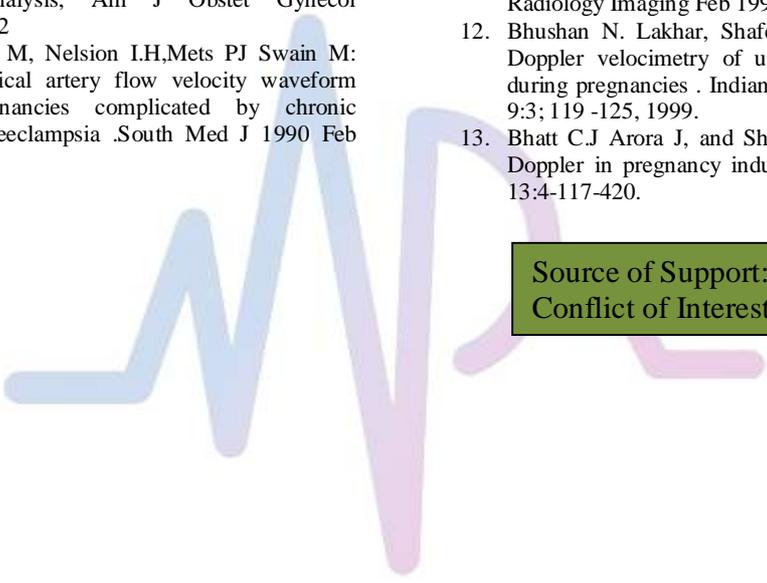
CONCLUSION

We conclude that Doppler study should be the primary imaging modality of choice for fetomaternal surveillance in Pregnancy induced hypertension and Pre-eclampsia. Doppler study helps Radiologists and Gynaecologists to

take timely action, plan the correct treatment and counsel the patients in future pregnancies.

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