

Doppler Changes in Pre-Eclampsia.

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Abstract: To assess the role of color doppler, placental location in PIH. 100 cases of pre-eclampsia aged between 20-40 years, of primi 2, multi 76, of 2nd trimester pts 24, 3rd trimester 76pts were studied for a period of 2 years. Doppler analysis of UTA, UMB A & MCA for S/D, PI, & RI, absence or reversal of EDV in UMB A were evaluated & followed up results were correlated. Our results of REDV & AEDV, increased S/D ratio, increased PI, RI indices were correlated with INDIAN & other studies relating to morbidity & mortality. Doppler study is the only non-invasive modality for the detection & follow up of pre-eclampsia cases to prevent mortality & morbidity.

INTRODUCTION

Hypertension is the most common medical complication in pregnancy. Pregnancy may induce hypertension in a previously normotensives or may aggravate pre-existing hypertension. Pregnancy induced hypertension a major cause of maternal mortality. Hypertension disease is also responsible for perinatal morbidity and mortality mainly due to its effect on the growing fetus. Diagnostic ultrasound provided a new dimension to the management of obstetric cases has aided in decreasing the infant mortality rate drastically.

Doppler studies and especially color doppler with spectral evaluation provided the right tool in forewarning the obstetrician about is impending problem which could become a disaster if not adequately prepared for and management protocols implemented. The aim of the study is to determine whether an association exists between placental location and pre-eclampsia. And to evaluate the role of doppler in predicting fetal outcome in patients with pre-eclampsia.

MATERIALS & METHODS

Hundred (100) pre-eclampsia patients general evaluation of the fetus was performed for: chronological scan, targeted study, AFI, EFW, status of fetus is assessed.

These patients had gestational age between 20-36 weeks were studied by color doppler over a period of 2 years. The findings at the time of first examination were taken into consideration. Repeat doppler studies were performed whenever required. Doppler velocity waveform analysis of umbilical, uterine & fetal MCA 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 waveforms were computed automatically, the average value of three such recording was obtained. A patient with rise of least 30 mm of Hg & 15 mm of Hg in systolic and diastolic pressure respectively over previous known blood pressure was diagnosed to have pre-eclampsia. If previously BP was not known then BP of at least 140/90 mm of Hg was considered abnormal. The data regarding perinatal outcome was collected which included birth weight (using New Ballard Scoring System in our hospital), no. of fetal & perinatal deaths, admission to NICU & number of days in NICU and mode of delivery. S/D ratio of greater than 3 & 2.6 in umbilical & uterine arteries respectively were considered abnormal. Absent end diastolic velocity (AEDV), reserved end diastolic velocity (REDV), & persistent early diastolic notch in uterine artery were considered abnormal, Increase in diastolic flow in fetal MCA suggested brain sparing effect seen in asymmetric IUGR.

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RESULTS

Age of patients; placenta location in pre-eclampsia; doppler analysis and fetal outcome are detailed in the following tables:

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

Age	No. of Patients	Percentage
<20	6	6%
21 – 25	46	56% (Max)
26 – 30	32	32%
31 – 35	12	12%
36 – 40	4	4% (Min)
Total	100	100%

Table - 2 : Location of Placenta in Pre-Eclampsia Cases (n= 100)

	Central	Lateral
No of cases	27(27%)	73(73%)

Table - 3: Doppler Analysis of Pre-Eclampsia Cases (n=100)

	Central	Lateral
Normal Doppler in PIH Cases	14(27%)	14(18%)
Abnormal Doppler in PIH Cases	13(27%)	59(82%)

Table - 4: Table Showing Fetal Outcome in Present Study

	No. of Patients	Percentage
Peterm deliveries	32	32%
Perinatal deaths	16	16%
Low birth weight	38	38%
Fetal distress	14	14%
Total	100	100%

Uterine Artery

In second trimester Doppler study of uterine artery was performed on 24 patients and early diastolic notch was noted in all the patients (fig. 1). In second trimester uterine artery doppler study showed elevated S/D ratio in 22 patients (92%) out of 24 patients, 20 patients (83%) had elevated RI and 4 patients (17%) were normal and 22 patients (92%) had elevated PI.

Out of 76 patients studied in third trimester 70 patients (92%) had persistent diastolic notch in uterine arteries, 6 patients (17%) did not show. 72 patients (94%) had elevated S/D ratio, 4 patients did not reveal any elevation, RI was elevated in 68 patients (89%), 8 patients (11%) RI was normal. Elevated PI was noted in 72 patients (94%) and was normal in 4 patients (6%).

Umbilical Artery

Second trimester Doppler study of umbilical artery reveals 14 patients (58%) had elevated S/D ratio and 10 patients (42%) had normal S/D ratio. Elevated PI index was noted in 16 patients (67%) and rest 8 patients (33%) had normal S/D ratio and absence or reversal of end diastolic was not detected (fig. 2 & 3).

Third trimester doppler study of umbilical artery in 70 patients (92%)

revealed elevated S/D ratio and was normal in 6 patients (8%). PI was elevated in 72 patients (95%) and was normal in 4 patients (5%). Reversal or absence end diastolic velocity was noted in 66 patients (87%) and was not present in 10 cases (13%).

Middle Cerebral Artery

Middle cerebral artery doppler study in second trimester showed was found to be within normal range in all the 24 patients (100%). MCI PI study in third trimester was decreased in 6pts (8%) and was normal in all the 70 patients. 73 patients (73%) were found to have lateral placenta and 27 patients (27%) had central placenta out of 100 patients studied. Abnormal doppler indices were noted in 13 patients out of 27 patients having central placenta. Abnormal Doppler indices were noted in 59 patients (82%) out of 73 patients having lateral placenta.



Fig.1 : Uterine artery Doppler showing diastolic notch at 32 weeks.



Fig.2: Umbilical artery Doppler showing absent diastolic flow at 30 weeks.



Fig.3 : Umbilical artery Doppler showing reversal of end diastolic flow at 32 weeks.

DISCUSSION

The present study comprised of total 100 patients and among these, maximum number of patients were in the age group of 20-25 years. Most patients in present study were multiparous and complications like oedema and proteinuria were seen in some of them. Patients were categorized based on their socioeconomic status into three division's upper N=20, middle = 34, lower = 46, according to Kuppuswamy Scale.

Out of 100 patients 24 patients were Primi, 76 were Multi gravidae. Out of which, 26 patients presented with oedema and 20 patients with preteinuria, rest had no associated complication like disturbance of vision, oligiuria. Early diastolic notch was seen in all the patients in second trimester, being a normal finding upto 26 weeks.

In the present study 24 patients scanned in 2nd trimester revealed 14 patients (68%) showed elevated S/D ratio, 16 (67%) patients showed elevated PI. No patient showed reversal/absence of end diastolic flow it is normal finding. Our findings are consistent with BATTAGLIA et al⁷ findings i.e. 63% & 64% respectively. Out of 76 patients studied in 3rd trimester 6 patients showed decreased PI in middle cerebral artery indicating presence of decreased impedance to cerebral circulation. Such fetuses are at high risk of poor perinatal outcome.

Out of 76 patients studied in 3rd trimester 70 showed persistent diastolic notch (92%) fig. (1) with elevated S/D ratio (94%), RI (89%), PI (94%) in both uterine arteries. Our finding is consistent with Fleischer et al¹ findings i.e. 80%, 93%, 85% and 90% respectively. Umbilical artery doppler at 3rd trimester reveals 70 (92%) patients had elevated S/D ratio, 72 (95%) patients showed elevated PI & 10 (13%) patients showed absence of end diastolic flow velocity fig. (2,3). These findings are consistent with Bataglia⁷ & Schuman et al³ findings i.e. 87%, 91% & 17% respectively. Similarly fetal outcome in the study i.e. preterm deliveries 32%, perinatal death 16%, low birth weight 38%, fetal distress 14%^{2,9,10,13} study 33%, 13%, 34%, 13% respectively correlates.

Abnormal doppler findings were noted in 59 patients who had lateral placenta and 13 patients were found to have abnormal Doppler findings of patient having central placenta. These findings were in consistent with findings of Bhushan, N. Lakhar¹¹, Kofinas et al⁵ study.

In the majority of the pts all the Doppler changes were returned to normal after bed rest & treatment.

CONCLUSION

We conclude that Doppler study should be the primary imaging modality of choice for fetomaternal surveillance in PIH pts, Doppler study helps us i.e. Radiologists and OB & Gynecologists to take timely action, plan the correct treatment and counsel the parents in future deliveries.

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