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To study women at risk of PIH (Primi & Multi) by colour doppler velocimetry of uterine arteries

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ABSTRACT

Background & Methods: The aim of the study is to study women at risk of PIH (Primi & Multi) by Colour Doppler velocimetry of uterine arteries. Pregnant women attending the antenatal clinics, screened for possible participation in the present study after explaining the nature of the study. A patient was diagnosed to have PIH if there was a rise in systolic pressure of at least 30 mmHg or a diastolic of at least 15 mmHg over the previously known blood pressure or an absolute rise in the blood pressure of at least 140/90 mmHg was taken to diagnose women as a case of PIH.

Results: Out of the 100 cases, maximum 35 cases (35%) were low risk primigravidae, followed by cases with history of PIH (15%), obesity (14%), Anemia (10%),Essential hypertension (7%), IUGR (7%),Which constitute 53%. Rest of the cases was family history of hypertension (6%), oligohydromnios (5%) and Twin (1%). Maximum cases i.e. 40% were illiterate, 28% cases were educated up to primary school and only 20% were educated up to middle school and above. Total 60% cases were literate. 77.2% babies were alive, Abortion were 5.3% and 16.76% cases were with poor perinatal outcome. Study shows that 22% cases showed abnormal waveform in colour Doppler, out of which 90.90% developed PIH, while 78% cases were with normal waveform out of which only 10.25% developed PIH later. For prediction of IUGR out of 22% of abnormal waveform 86.36 developed IUGR and out of 78% of normal waveform 20.51% developed IUGR.

Conclusion: We conclude that a women with high risk factor (nulliparity and others) having abnormal uterine artery waveforms between 16-28 weeks of gestation (presence of diastolic notch with/without high resistance) are at higher risk of development of PIH (90.90%) and IUGR (95%). An important aspect is the high negative predictive value for PIH (89.74%) and IUGR (78.66%) which helps to detect those patient who will not develop PIH and IUGR early positive prediction enables, one to take preventive measures early thus improving both maternal and perinatal prognosis.

1. Introduction

In women with preeclampsia physiological changes in uteroplacental vessels are limited to decidual portion of the arteries only.[1] The vessel segment within the myometrium remains intact.This occurs due to failure / inhibition of second wave of endovascular trophoblast, in migration into the myometrial segments of the arteries. It is also said that in preeclampsia, not all spiral arteries of the placental bed are invaded by first trophoblastic invasion i.e. there is partial failure of placentation. The imbalance between PgI2 and TXA2 may be responsible for poor presentation, also atherosclerosis and thrombosis as Evident by fibrinoid necrosis of arterial wall, presence of lipid and lipophase, mono nuclear infiltration around the damaged vessels.[2] Thus in pre-eclampsia, failure of 2nd trophoblastic invasion wave along with acute atherosclerosis, narrows the vascular

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lumen, leading to high resistant flow.

Aberrations in normal developmental processes, such as premature exposure to oxygen and deficient spiral artery remodeling, have been implicated in several complications of pregnancy, including miscarriage, preterm labor, preeclampsia, and IUGR.[3] For example, early exposure of the developing embryo to oxygen is associated with early pregnancy failure. The onset of intervillous circulation in many pregnancies destined for miscarriage have been noted to be premature and diffuse with associated increase in levels of oxidative stress and apoptosis.[4,5]

In many cases of pregnancies with adverse outcomes, failure of trophoblast invasion of spiral arteries has been observed, resulting in high-resistance vasculature with persistent smooth muscle histology of the maternal blood vessels.[6,7] Current evidence suggests that the placental pathology associated with deficient spiral artery remodeling is principally the consequence of oxidative stress and mechanical injury resulting from turbulent intermittent blood flow rather than chronic hypoxia.[8].

2. Materials and Methods

The present observational study was conducted at…for 01 Year. Pregnant women attending the antenatal clinics, screened for possible participation in the present study after explaining the nature of the study. A patient was diagnosed to have PIH if there was a rise in systolic pressure of at least 30 mmHg or a diastolic of at least 15 mmHg over the previously known blood pressure or an absolute rise in the blood pressure of at least 140/90 mmHg was taken to diagnose women as a case of PIH.

2.1. Study design

Observational Study.

2.2. Inclusion criteria

Selected women between 16-28 weeks of gestation with following high risk factor were enrolled.

2.3. Selection criteria

1. Primigravidae
2. Primi / multi gravidae with other risk factors
3. Essential hypertension, obesity, renal disorder, anaemia

3. Result

Out of the 100 cases, maximum 35 cases (35%) were low risk primigravidae, followed by cases with history of PIH (15%), obesity (14%), Anemia (10%), Essential hypertension (7%), IUGR (7%), Which constitute 53%. Rest of the cases were family history of hypertension (6%), oligohydromnios (5%) and Twin (1%).

Table 1: Distribution according to risk factors

	No. of Cases N=100		Percentage
	Primi	Multi	
Low Risk primi	35	-	35%
Obesity	02	12	14%
History of PIH	-	15	15%
Family History of Hypertension	02	04	6%
Essential Hypertension	01	06	7%
Oligohydromnios	03	02	5%
IUGR	03	04	7%
Anemia	04	06	10%
Twins	-	01	1%

Table 2: Distribution of cases according to education

Education	No. of cases (n=100)	
	No.	%
Illiterate	40	40%
Primary	28	28%
Middle	20	20%
Higher Secondary	08	8%
College	04	4%

Present study shows maximum cases i.e. 40% were illiterate, 28% cases were educated up to primary school and only 20% were educated up to middle school and above. Total 60% cases were literate.

Table 3: Distribution of case according to perinatal outcome

Outcome of labour	No. of case (n=101)	Percentage
Live Birth	78	77.2%
Neonatal death	14	13.86%
Still birth	3	2.9%
Abortion	6	5.3%

Present study shows, 77.2% babies were alive, Abortion were 5.3% and 16.76% cases were with poor perinatal outcome.

Study shows that 22% cases showed abnormal waveform in colour Doppler, out of which 90.90% developed PIH, while 78% cases were with normal waveform out of which only 10.25% developed PIH later. For prediction of IUGR out of 22% of abnormal waveform 86.36 developed IUGR and out of 78% of normal waveform 20.51% developed IUGR.

4. Discussion

In our study 35% cases have primigravidity as a risk factor, out of other common known risk factors History

Table 4: Incidence of abnormal waveform in uterine arteries in high risk pregnancies

Waveform	N=100	%	No, of cases developed PIH	%
Normal Waveform	78	78%	08	10.25%
Abnormal Waveform	22	22%	20	90.90%
Total no of cases	100	-	28	28%

of PIH (15%), obesity (14%), Anemia (10%), essential hypertension (7%), IUGR (7%), which constitute 53%. Rest of the cases were family history of hypertension (6%), oligohydromnios (5%) and Twin (1%).[9]

All subject were primigravidae considering primigravidity to be an individual risk factor because PIH is also common in those women.

In the present study 40% women were illiterate and 60% were literate, out of 40% illiterates 54.54% were screen positive and among 60% of literates 16.66% were screen positive.

In our study overall 77.22% babies were alive and healthy, whereas, 22.77% were with poor perinatal outcome. Poor perinatal outcome occurred in 45% of screen positive cases who developed PIH later compared to 0% in screen negative cases. Diastolic notch positivity shows more severe form of PIH and poor fetal outcome. In a study by Department of Health & Human Services, USA adverse outcome were 6.6% in low risk and 28.2% in high risk respectively, which is comparable to our study.[10] There were similar perinatal outcome in both low risk and high risk groups with normal colour Doppler waveform. Infants born to screen positive cases have higher abnormal fetal heart rate low Apgar score at 5 minutes and spent longer period in NICU. In the pregnancies with abnormal outcomes, the uterine and umbilical arteries had a reduced diastolic flow or even reverse diastolic flow, leading to fetal distress or intrauterine death.[11,12] The same observation was noted which is comparable to our study. In different women, the rate of progression and the organ systems affected can be different. There needs to be an initial placental but it is the maternal response that probably modifies the disease presentation and progression.[13–15]

In our study, 22 (22%) cases show abnormal waveform in colour Doppler, out of which 20 (90.90%) developed PIH later. In 78 (78%) cases with normal waveform, 8 (10.25%) developed PIH later. Overall 28% cases developed PIH later in the study out of which 71.42% were predicted by colour Doppler. 2 cases were false positive and 8 cases were false negative.[16]

5. Conclusion

We conclude that a women with high risk factor (nulliparity and others) having abnormal uterine artery waveforms between 16-28 weeks of gestation (presence of diastolic notch with/without high resistance) are at higher risk of development of PIH (90.90%) and IUGR (95%). An important aspect is the high negative predictive value for PIH (89.74%) and IUGR (78.66%) which helps to detect those patient who will not develop PIH and IUGR early positive prediction enables, one to take preventive measures early thus improving both maternal and perinatal prognosis.

6. Source of Funding

None.

7. Conflict of Interest

None.

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