Role of Colour Doppler in High Risk Pregnancy and Correlation with Perinatal Outcome

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Abstract: *Aim: To assess role of colour doppler in detection of perinatal outcome in high risk pregnancy. Material and method: The prospective study was conducted on 200 high risk patient with 200 control who attend OPDs indoor in Obst & Gyne department of MLB Medical College, Jhansi. All patient had serial doppler after informed consent and followed with regard to perinatal outcome. Result and Conclusion : Colour Doppler is evaluation reflects fetal hemodynamics adequately. The results of our study support use of colour doppker in prediction of perinatal outcome and mode of delivery can be decided upon Doppler studies to improve perinatal outcome in high risk pregnancy.*

Keywords: MCA (Middle cerebral artery), PIH (Pregnancy induced hypertension), PI (Pulsatility index), RI (Resistivity index)

1. Introduction

The basic aim of an obstetrician is to give a healthy baby and a healthy mother and task becomes difficult in cases of high risk pregnancies. It has been assumed that insufficient uterine, placental and foetal circulation results in adverse pregnancy outcome. These abnormalities can be defined by use of Doppler ultrasonography where foetal and maternal vessels are examined by ultrasound waves, reflected by red cells moving inside the blood vessels. The difference in frequencies between emitted and reflected waves, known as Doppler shift, is submitted to spectrographic analysis and represented graphically as waveform.

Doppler velocimetry is rapid non invasive test that provide valuable information about hemodynamic situation of fetus which help intensely intervention and management of high risk pregnancy for better prenatal outcome.

2. Material and Methods

This study was conducted on pregnant women with high risk factors undergoing colour Doppler in the Obst. & Gynae department of MLB Medical College, Jhansi in association of Department of Radiodiagnosis of MLB Medical College, Jhansi, UP for the period of 1st Jan 2016 to 30th June 2017. Randomly 200 high risk cases and 200 controls were selected for study.

Inclusion Criteria

High risk factors considered
- Pre eclampsia
- Intra Uterine Growth Restriction
- Gestational diabetes mellitus
- Anemia
- Previous Ceaserean section
- Bad obstetric history (previous intrauterine fetal death)
- Previous intrauterine fetal death
- Rh isoimmunisation
- Twin pregnancy

A detailed history regarding name, age, occupation, socioeconomic status, education status, menstrual history, obstetric history, past history of any chronic medical disease and diabetes.

All the women selected for study were subjected to complete general examination including pulse, blood pressure, temperature, respiratory rate, pallor, odema, jaundice. Systemic examination including careful assessment of cardiovascular system, respiratory system, and central nervous system was done.

Obstetrical examination including per abdominal examination was done in all patients along with investigations such as:
- Complete hemogram including Hb%, ABO/Rh, random blood sugar
- Urine –routine and microscopy
- Ultrasound colour Doppler
- Other investigations where necessary

Perinatal outcome was measured in forms of:
- Low birth weight
- Prematurity
- IUGR
- Still birth/IUD
- NICU admission
- Healthy baby

Obstetrical outcome was measured in form of gestational age of delivery and mode of delivery.

3. Observations

Table 1: Distribution of high risk pregnancy

Presentation	No.	Percentage
PIH	60	30
IUGR	60	30
Oligo	20	10
Multiple pregnancy	10	5
DM	10	5
Anemia	10	5
Bad obs (previous IUD)	10	5
R h ISO	10	5
Pre C.S.	10	5

Table 2: Comparison of umbilical artery Doppler indices

Umbilical artery	Study group	Control group	p value
PI	1.70±0.3	0.84±0.2	<0.001
RI	0.74±0.16	0.5±0.7	<0.001
S/D	3.8±0.8	2.15±0.2	<0.001

Table 3: Comparison of uterine artery doppler

Uterine artery	Study group	Control group	p value
PI	0.97±0.3	0.59±0.12	>0.05
RI	0.58±0.7	0.43±0.06	>0.05
S/D	1.82±0.59	1.55±0.26	<0.001

Table 3: Comparison of middle cerebral artery doppler

MCA	Study group	Control group	p value
PI	1.07±0.28	1.28±0.23	<0.001
RI	0.65±0.07	0.74±0.19	<0.001
S/D	3.02±1.02	3.91±0.92	<0.001

Table 4: Distribution of colour Doppler findings

Colour Doppler finding	No. of cases	Distribution of cases
Uteroplacental insufficiency	40	20 PIH & 20 PIH + IUGR
fetoplacental insufficiency	30	IUGR + PIH+
decreased amnionic fluid volume	100	IUGR+Anemia+PIH+oligo hydramnios
presentation of uterine notch	15	PIH
Increased uterine resistance	15	IUGR
Decrease diastolic flow in umbilical artery	20	PIH+IUGR
Increase diastolic flow (↓S/D ratio) in MCA	20	IUGR+PIGH
Increase middle cerebral peak systolic velocity (PSV)	10	Rh iso immunization+ Anemia

Table 5: Obstetrical Outcome

Average time of delivery	Control group		Study group	
Average time of delivery	37.6 weeks		35.6 weeks	
Mode of delivery	No.	Percentage	No.	Percentage
Vaginal	170	85%	128	64.0%
LSCS	30	15%	72	36.0%
Total	200	100%	200	100%

Table 6: Comparison of perinatal outcome in study and control group

Variable	Control group	Study group
Birth weight	29±0.3	2.2±0.5
Apgar Score	6.8±0.6	7.4±5
NICU Admission	17	49
Neonatal death + IUD	6	16

4. Results

Distribution of cases are PIH (30% and IUGR 30%) with or without PIH oligohydramnios 10%, twin pregnancy 5%, diabetic mellitus 5%, Anemia, previous IUD, Rh iso immunization 5%, 5%, 5% pre CS 5%.

Doppler finding were most abnormal in the group with concometent PIH and IUGR. All 30 cases PIH have either cerebroplacental insufficieny or fetoplacental insufficiency or diastolic notch in uterine artery. All IUGR associated with PIH or not have fetoplacental insufficiency and decrease amniotic fluid volume found. Increase diastolic flow in

MCA with decrease diastolic flow mainly found in IUGR cases.

Table 2 shows that PI, RI and S/D of umbilical artery were significantly higher in study group (1.7, 0.74, 3.84) than control group (0.84,0.56, 2.15) and p value is <0.001.

Table 3 shows comparison of uterine artery indices in study (0.97, 0.57, 1.82) and control group (0.59, 0.43, 1.55) only the SD ratio was significantly different between the two groups (p<0.001).

Table shows that PI, RI, S/D ratio of MCA in high risk pregnancy 1.08, 0.65, 3.02) were significantly lower than the control group.

In high risk group role of LSCS is more 36% compared to control group (15%) and NICU admission was also high (24.5%) compared to control group (8.5%). Mean birth weight in study group was 2.2 compared to 2.9 gm in control group (1.28, 0.74, 3.91) and p value is 0.001.

Apgar score at 1 minute and 5 minute was significantly lower in high risk group than the control group.

5. Discussion

In present study mean age was 25.5 years for study group and 23.7 years for control group. Majority of patient in study group had PIH (pregnancy induced hypertension) and IUGR. Mean amniotic fluid index was significantly low in high risk group as compared to control group in the present study. PI, RI and S/D value of umbilical artery showed significantly higher value in study group as compared to control group (p<0.001) represents increased peripheral findings consequently decreased diastolic flow leading to fetal comparison.

Brain sparing effect finding in high risk pregnancy in presence of fetal hypoxia, due to placental insufficiency. In present study LSCS is more in comparison to control group. This indicating increase operative intervention in high risk group compared to control. The mean birth weight and apgar score were low in study group and there was higher admission rate to NICU and increased perinatal death in study group. The umbilical and MCA artery indices were abnormal in the growth when baby were admitted in the NICU as compared to those whom babies were not admitted. Poor parenatal outcome in the presence of abnormal indices and in presence of fetal anemia, several investigators like Gramellerie et al, Berkruts et al and Farlie et al have demonstrated the correlation between abnormal Doppler indices of fetal vessels and adverse perinatal outcome and fetal distress.

According to systemic review by Imalael et al (2011) the effectiveness of Doppler velocimetry of umbilical versus fetal artery in high risk pregnancy together with the appropriate intervention reduced parenatal morbidity by 99% which is comparable to our study.

Chaltoni N (2011) mention in her review article that doppler ultrasonography of umbilical artery in high risk pregnancy

reduced sonographically the number of antenatal admission, 44% induction of labour and cesarean section for fetal distress (52%). Additionally the clinical action guided Doppler ultrasonography reduced the probability of prenatal death.

6. Conclusion

We concluded that Doppler ultrasound evaluation reflects fetal haemodyamics adequately the results of our study supports the use of Doppler umbilical, middle cerebral artery wave form analyse as on important fetal well being. Thus, in consultation with obstetrical outcome and mode of delivery can be decided up on the Doppler studies to improve parenatal outcome in high risk group.

References

[1] Chin PF, Arnott N, Gordan A et al; How useful is uterine artery Doppler flow velocimetry in the prediction of pre-eclampsia, intra uterine growth retardation and perinatal death: An over view BJ OG 2000 Feb., 107(2) 196-208.

[2] Zhang J, Kiebanoff MA, Roberts JM: Prediction of adverse outcomes by common definitions of hypertension in pregnancy. Obstet Gynecol 97; 261, 2001.

[3] Ajne G, Wolf K, Fuhrauist F, et al: Endothelin converting enzyme activity in normal pregnancy and preeclampsia. Hypertens pregnancy 22: 215, 2003.

[4] Harnington K, Campbell S, Bewleys, and Bower S (1991) Doppler velocimetry studies of the uterine arteries in early prediction of preeclainpsia and intrauterine growth retardation. Eur J Obstet. Gynecol, Reprod. Biol. 42, S14- S20.

[5] Harnington K, Carpenter RG, Goldfrod and Campbell S: Transvaginal Doppler Ultrasound of the uteroplacental circulation the early prediction of preeclampsia and intrauterine growth retardation, Br J, Obstet Gynecol. 104, 674-681.

[6] K. Saxena et al: Blood flow studies by Doppler Sonography - Basic mechanism , J. of U.P. Chapter of Obst. and Gynae Vol VI Pg. 6-13, 2000.

[7] S.Rastogi et al : Role of colour doppler in high risk pregnancy , J. of U.P. chapter of Obst. and Gynae Vol VI Pg. 82-86,2000.

[8] Hayman R, Warren A, Brockeisby J, et al.: Plasma from women with preeclampsia induces an in vitro alteration in the endothelium dependent behavior of myometrial resistant arteries. Br J obstet Gynaecol 107: 108, 2000.

[9] American College of Obstetricians and Gynecologists: Diagnosis and Management of preeclampsia and eclampsia. Practice Bulletin No. 33, January 2002.