



HIGH RISK PREGNANCIES WITH OLIGOHYDRAMNIOS AND ITS CORRELATION WITH FETAL DOPPLER STUDY IN THIRD TRIMESTER OF PREGNANCY

Dr. V. Bhavani Devi*

M.D (O &G) Associate Professor In Obstetrics And Gynaecology, Thoothukudi Medical College. *Corresponding Author

Dr. B.S.Gayathri

MS (O&G). Post Graduate In Obstetrics And Gynaecology, Thoothukudi Medical College.

ABSTRACT To assess the Doppler data in predicting the adverse pregnancy outcome in high risk pregnancies like hypertensive disorders complicating pregnancy, intrauterine growth retardation, diabetes mellitus, oligohyramnios and bad obstetric history. Doppler study was done for uterine artery, umbilical artery, and middle cerebral artery. It was a hospital based prospective study of 100 pregnant women from 28 weeks to 40 weeks. We concluded that, this is an outpatient technique with a better predictor of adverse maternal and perinatal outcome. Predictive value is more for cerebro placental ratio (CPR) compared to pulsatility index of umbilical artery (PI UA) and pulsatility index of middle cerebral artery (PIMCA).

KEYWORDS : Cerebro Placental Ratio (CPR), Pulsatility index (PI), Umbilical artery (UA), Middle cerebral artery (MCA)

INTRODUCTION:

The wonder of Doppler Effect⁽¹⁾ is observed when an ultrasound beam encounters blood flow. During blood circulation millions of red blood cells act as moving scatters of the incident ultrasound. At that time erythrocytes act as first moving receiver and then as moving sources, thus forming the basis of Doppler equation⁽²⁾

$$fd = 2ft1 v/c$$

fd – Doppler frequency shift

ft - Frequency of incident beam

v – Velocity of the scatter in a given direction

c – Propagation speed of sound in the medium

Blood flow characteristics can be calculated using various Doppler indices⁽³⁾ such as systolic / diastolic ratio (S/D), resistance index (RI), pulsatility index (PI) over any vessel.

S/D ratio: Peak systolic velocity/End diastolic velocity = A/B

RI: Peak systolic –End diastolic velocity /Peak systolic velocity = A–B/A

PI: Peak systolic –End diastolic velocity/mean velocity = A-B/mean velocity

Cerebro Placental Ratio –MCAPI/UA PI

Incidence of fetal hypoxia leads to redistribution of fetal circulation to heart, kidneys and brain. Therefore compensatory vasodilatation of middle cerebral artery with increase in diastolic flow results in decrease in pulsatility index and resistive index named as brain sparing effect. Granellini et al. ⁽⁴⁾ studied in 45 normal growth fetus and 45 growth retarded fetus and concluded that cerebro umbilical ratio <1.08 was in use as abnormal and predicted adverse perinatal outcome with 90% accuracy as compared to MCA PI or UA PI alone. Bano S et al. ⁽⁵⁾ stressed that C/U PI ratio is a better predictor .Therefore it is concluded that pregnancies with CPR >1 is normal.

MATERIALS AND METHODS:

This is a hospital based study for a period of 1 year from August 2019 to August 2020. 100 pregnant women with Gestational hypertension, Pre-eclampsia, Chronic hypertension, Intrauterine growth retardation, Gestational diabetes mellitus, Overt diabetes mellitus, Oligohyramnios were selected randomly after satisfying the inclusion and exclusion criteria. A detailed history and examination was done according to gestational age from 28-40 weeks. Those with twin pregnancy, chromosomal, congenital anomalies were excluded from the study. Fetal surveillance was done with fundal height, abdominal girth, daily fetal movement count, twice weekly non stress test, modified biophysical profile and amniotic fluid volume. Ultrasonogram and Doppler velocimetry of umbilical, middle cerebral and uterine artery were studied. Mode of delivery, fetal outcome documented and analysed.

RESULTS

Patients with Amniotic fluid index <5 are more likely to have CPR<1. Maximum number of cases with CPR<1 was observed in Hypertension complicating pregnancy with oligohyramnios. They

are more likely to have non reassuring CTG, intrapartum fetal distress, more prone for cesarean section, the most common indication being fetal distress. With CPR<1 babies are more prone for perinatal asphyxia, Respiratory Distress Syndrome, Hypoxic ischaemic encephalopathy, Meconium Aspiration Syndrome, sepsis, hypothermia, hyperbilirubineimia, low birth weight, mortality during and after delivery. Babies of patients with hypertension, oligohyramnios and CPR<1 are prone for respiratory distress. Babies of patients with oligohyramnios, IUGR and CPR <1 are more prone for meconium aspiration syndrome. Comparing the Doppler indices CPR, PI UA, PI MCA with maternal and neonatal complications CPR was more significant. Therefore it can be considered as better indicator among Doppler indices.

Table: 1 Maternal Risk Factors Vs Cerebro Placental Ratio

RISK FACTORS		CPR		P Value
		<1	>1	
HYPERTENSION	NO	6	18.8%	0.049
	YES	26	81.3%	
DIABETES MELLITUS	NO	27	84.4%	0.872
	YES	5	15.6%	
INTRA UTERINE ROWTH RETARDATION	NO	5	15.6%	0.872
	YES	27	84.4%	
BAD OBSTETRIC HISTORY	NO	31	96.9%	0.576
	YES	1	3.1%	

Table: 2 Amniotic Fluid Index Vs Cerebro Placental Ratio

		AMNIOTIC FLUID INDEX		TOTAL	P VALUE
		<5	>5		
CEREBRO PLACENTAL RATIO	<1	24	8	32	0.018
	>1	34	34		
TOTAL		58	42	100	

Table: 3 Neonatal Complications Vs Cerebro Placental Ratio

NEONATAL COMPLICATIONS		CPR		P value
		<1	>1	
PERINATAL ASPHYXIA	NO	4	12.5%	<0.0001
	YES	28	87.5%	
RESPIRATORY DISTRESS SYNDROME	NO	7	21.9%	<0.0001
	YES	25	78.1%	
HYPOXIC ISCHAEMIC ENCEPHALOPATHY	NO	26	81.3%	0.019
	YES	6	18.8%	
HYPERBILURUBINEMIA	NO	22	68.8%	0.084
	YES	10	31.3%	
MECONIUM ASPIRATION SYNDROME	NO	22	68.8%	0.054
	YES	10	31.3%	
SEPSIS	NO	25	78.1%	0.017
	YES	7	21.9%	

HYPOTHERMIA	NO	23	71.9%	64	94.1%	0.002
	YES	9	28.1%	4	5.9%	
HYPOGLYCEMIA	NO	24	75.0%	64	94.1%	0.006
	YES	8	25.0%	4	5.9%	

9. Anthony O Odibo, Christopher Riddick, Emmanuelle Pare, David M Stamillio, George A Macones – Cerebroplacental Doppler ratio and adverse perinatal outcomes in intrauterine growth restriction: evaluating the impact of using gestational age specific reference values. *Journal of ultrasound in medicine* 24(9), 1223-1228, 1005.

DISCUSSION:

Out of 100 patients, 69% were primi gravida and 31% were multi gravida. Age and parity had no influence on our study group. Our study group had 69% of hypertension complicating pregnancy, diabetes complicating pregnancy were 13% Bad obstetric history constituted 5% and 87% were Intra uterine growth retardation complicating pregnancy. 26 out of 69 hypertensive mothers, 5 out of 13 diabetic mothers, 1 out of 5 Bad obstetric history, 27 out of 87 Intra uterine growth retardation complicating pregnancies had $CPR < 1$. On comparing CPR with PI UA and CPR with < 1 and > 1 , 32 patients had $CPR < 1$ and 68 had $CPR > 1$. On comparing CPR with Hypertension statistically significant P value of 0.049 was observed. It is seen that hypertension complicating pregnancy had direct CPR changes $\neq 1$, which reflected the maternal and fetal outcome and most of the patients went for cesarean section due to fetal distress. $CPR < 1$ with amniotic fluid index < 5 had a significant P value of 0.018. On comparing CPR with gestational age a significant P value of 0.001 was observed. 24 babies were preterm. They act as confounding factor in our study. Since preterm itself has direct effect on fetal distress during labour and delivery, it has direct influence on neonatal admission. On comparing CPR with intrapartum cardiotocogram statistically significant P value of 0.0001 was observed. Maximum number of Non reassuring CTGs were seen in patients who had $CPR < 1$. On comparing CPR with mode of delivery a statistically significant P value of 0.002 was observed. $CPR < 1$ were mostly delivered by cesarean section. In the study at Egypt by Allam Nahed et al.⁽⁶⁾ showed a significant association between CPR and operative deliveries with a mean 0.888 and P value 0.05. On comparing IUGR with neonatal complications a P value of 0.044 was observed in babies with meconium aspiration syndrome. On comparing bad obstetric history with neonatal complications a P value of 0.005 was observed in babies with perinatal asphyxia. On comparing CPR with birth weight a P value of < 0.0001 was observed. $CPR < 1$ had associated neonatal complication.

Mr. Allam Nahede found specificity of 95% of CPR in determining the adverse perinatal outcome. Rajesh Malik et al.⁽⁷⁾ had emphasized that PI MCA/ PI UA ratio are constant in last 10 weeks of pregnancy and should be maintained at 1.08. Mishra et al.⁽⁸⁾ compared the sensitivity, specificity of PI UA, PI MCA and CPR which was 53% and 82%, 43% and 80%, 86% and 92% respectively. He concluded that CPR is a better predictor of adverse perinatal outcome. Anthony odibo and Christopher Riddick⁽⁹⁾ stated that the sensitivity and specificity of $CPR \leq 1.08$ is 72% and 62% in predicting adverse perinatal outcome. There were three perinatal deaths in our study. They were, two due to intrapartum asphyxia and one due to meconium aspiration syndrome. On comparing CPR with perinatal death P value of 0.010 was observed. All mothers were discharged in good condition. 97 babies were discharged in good condition.

CONCLUSION

Doppler study is a simple, easy, effective outpatient technique with a better predictor of adverse maternal and perinatal outcome. Predictive accuracy is more for CPR compared to PI UA and PI MCA and is best in hypertension, diabetes, intra uterine growth retardation and bad obstetric history. It is used effectively in high risk pregnancies with oligohydramnios.

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