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ROLE OF COLOR DOPPLER IN PREGNANCY INDUCED HYPERTENSION: A CASE BASED STUDY IN A TERTIARY CARE HOSPITAL

Radiodiagnosis

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ABSTRACT

Aim: To study role of adding color Doppler in routine ultra sonographic examination in cases with pregnancy induced hypertension

Methods: This study was conducted in Department of Radio diagnosis, Kannur Medical College, a tertiary care teaching institute in Kerala. Study periodwas six months. The pregnant women coming to radiology department was randomly selected during the study period. A total of 110 pregnant women were included in the study. The study procedure was explained to each patient and informed consent was obtained. All were subjected to color Doppler scan along withroutine USG abdomen scan. In color Doppler evaluated the blood flow in umbilical, maternal uterine and fetal middle cerebral artery and compared between cohorts of cases with pregnancy induced hypertension (PIH) and pregnant cases without any known complications.

Results: Among PIH group incidence of abnormal S/D ratio in umbilical artery and uterine artery were65% and 57.8% respectively, whereas its only 4% and 2.8% in normal pregnancy group. Similarly abnormal fetal MCA doppler was 40% among PIH group when compared to 9.6% among Normal pregnancy cases. Thusamong the total cases, cohort of cases with pregnancy induced hypertension was having a higher incidence of significant changes in blood flow in three arteries when compared with normal pregnant cases.

Conclusions: Color Doppler plays major role in the diagnosis of complications associated with pregnancy induced hypertension.

KEYWORDS

Doppler, fetal, hypertension, blood flow, umbilical artery, uterine artery, pregnancy

INTRODUCTION

Hypertensive disorder in pregnancy can affect the maternal and fetal mortality as well as morbidity. It accounts for a total of 7.10 percent of perinatal mortality in developed countries. It is more in (20 %) in developing countries[1,3]. During the pregnancy time blood circulation should meet the demands of the growing fetus. The requirements increase as days increases. A required change in uteroplacental and fetoplacental circulation is necessary for normal pregnancy outcome[4]. Therefore timely diagnosis of fetal compromise by tests of fetal surveillance is very important[5-7]. Color Doppler is one of the important tool used in the radiology to diagnosis various disorders. By the use of color Doppler method, can possible early detection of fetuses at risk during pregnancy[8,9]. The present study aimed to use of color Doppler in the diagnosis of complications associated with pregnancy induced hypertension.

Materials and Methods

Design and Study settings

The study was conducted in Department of Radiology, Kannur Medical College, Kerala. It is an observational hospital based study. The study period was 6 months (Dec 2017 to May 2018)

Inclusion criteria

- Age between 20-35 years
- Antenatal cases beyond 28 weeks of gestational age
- Antenatal cases clinically diagnosed with pregnancy induced hypertension

Exclusion criteria

- Antenatal cases less than 28 weeks of gestational age
- Twin/ multiple pregnancy
- Pregnancy complicated with diseases other than hypertension

Procedure

The cases were selected who were coming for the USG abdomen scan during pregnancy period. A total of 110 pregnant women's were observed. Before starting the study procedure all the subjects were explained study procedure and informed consent was obtained. Among that 40 cases were having pregnancy induced hypertension as diagnosed by consultant gynoecologists of concerned cases as per standard protocols. All included cases were subjected to color Doppler. Three major arteries' flow velocities (Umbilical, maternal uterine and fetal middle cerebral artery) were evaluated with color Doppler. Umbilical arteryFlow velocity ratio of systolic/diastolic(S/D ratio)>/= 3, uterine artery S/D ratio >/=2.6,Fetal MCA pulsatality index(PI) more than 95th centile and less than 5th centile corresponding to gestational age were taken as abnormal. Each case demographic and scan data were recorded and expressed instandard mathematical expressions. Data analyses was done using SPSS version 20. Total cases were divided in to 2 cohorts: Cases with PIH and pregnant cases without any known complications. Incidence of abnormal Doppler findings were calculated in each cohort and compared[10].

RESULTS

In the present study out of the 110 pregnancies 40 were having PIH. Most of the cases were age between 26-30 years; n=43(with PIH n=19). 3 out of 29 cases with age group 20-25 years were having PIH. But incidence of PIH was high among age group 31-35; 18 out of total 28 cases. Incidence of abnormal Umbilical artery S/D ratio was 65% in PIH Group against 4% inNormal group. This was slightly less in abnormal uterine artery S/D ratio showing 57.5% and 2.8% among PIH group and Normal group respectively. Both umbilical and uterine artery abnormality in Doppler was seen in 40% (n=16) of PIH group, whereas only1.4% among normal group. Fetal MCA PI was abnormal in 40% (n=16) of PIH group and 9.6% (n=6) among Normal group. Among PIH group all three vessel parameters were abnormal in 25% cases and they were having poor fetal outcome. None of normal group showed all 3 vessel abnormality.

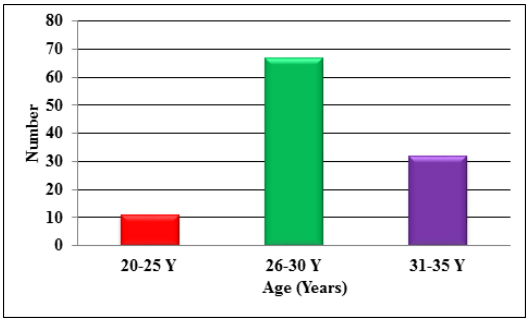
DISCUSSION

Pregnancy induced hypertension is a common complication during pregnancy. Application of color Doppler ultrasound in obstetrics allows us to study the changes in uteroplacental and fetoplacental circulation in adverse conditions like pregnancy induced hypertension. By serial Doppler studies, we can follow the sequence of changes in response to fetal hypoxemia and other complications. In this study out of total 110 cases, 40 were having clinically diagnosed pregnancy induced hypertension. Incidence of abnormal velocimetry in umbilical artery,uterine artery and fetal middle cerebral artery were significantly high in cases with PIH when compared to antenatal cases without PIH.Umbilical artery velocimetry correlates with hemodynamic changes in the fetoplacental circulation. With increase in number of tertiary stem villi & arterial channels, fetoplacental compartment develops & the impedance in the umbilical artery decreases. From 15 weeks of gestation umbilical artery resistance declines & the diastolic component appears in the waveform during

early second trimester. Study done by Fleisher et.al showed about 40% of hypertensive pregnancies have increased resistance in the umbilical arteries and uterine arteries[11]. The Slightly higher incidence was observed in our study probably due to more referred cases to tertiary care hospital. Thaleret.al evaluated 140 hypertensive pregnant women out of them 27.80 percent had increased changes in SD ratio in both umbilical and uterine artery[12]. In the present study also 25.00% increased SD ratio was observed. Thusharet.al study showed similar observation in fetal middle cerebral artery PI values like present study[13]. Evaluation of these three arteries plays major role in the evaluation of pregnancy induced hypertension and it's fetal out come. Regular color Doppler evaluation is suggested women are diagnosed with pregnancy induced hypertension.

CONCLUSION

The study showed changes in three arteries in pregnant women with hypertension. From this study results it conclude color Doppler study of feto-meternal circulation in all cases of pregnancy induced hypertension is highly recommended for early identification of possibilities of fetal complications associated with PIH.



Graph-1: Distribution of patients based on the age

Table-1: Evaluation of three different arteries

Observation	PIH Group		Normal Group	
	Normal Doppler	Abnormal Doppler	Normal Doppler	Abnormal Doppler
Umbilical artery SD ratio	14	26	3	67
Uterine artery SD ratio	17	23	2	68
Middle cerebral artery	26	16	6	62

Table-2: Evaluation of normal and abnormal arteries

Observation	PIH		Normal	
	Normal Doppler	Abnormal Doppler	Normal Doppler	Abnormal Doppler
Both Umbilical and Uterine arteries	26	16	1	69
Umbilical, uterine and middle cerebral arteries	30	10	0	70

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