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Original Research Article

To determine the accuracy of uterine artery, Umbilical artery & Middle cerebral artery Doppler flow velocity waveform in detecting I.U.G.R. in high risk pregnancies.

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Abstract:

Background &Method: The aim of this study is to determine the accuracy of uterine artery, Umbilical artery & Middle cerebral artery Doppler flow velocity waveform in detecting I.U.G.R. in high risk pregnancies.A total of fifty cases were included in the study. These comprised some cases of pregnancy associated with maternal disorders thereby comprising the obstetric high risk group. These were selected from the antenatal clinics as well as the maternity wards.

Result: The sensitivity of uterine artery waveform in identifying IUGR in high risk group was 31.6% with a specificity of 61.7% and positive predictive value 82.6% and negative predictive value of 13.9%. The sensitivity of umbilical artery waveform in identifying IUGR in high risk group was 23.9% with a specificity of 76.6% and positive predictive value of 84.7% and negative predictive value of 17.2%. The sensitivity of Middle cerebral artery waveform in identifying IUGR in high risk group was 12.1% with a specificity of 88.3% and positive predictive value of 82.8% and negative predictive value of 16.1%.

Conclusion: To conclude USG is an important tool in the hands of sonologist for fetal growth monitoring. It is the necessity for obstetric management as an early and accurate diagnosis of fetal growth retardation will help to bring down the perinatal mortality and morbidity, which is our basic aim while providing good maternal and child health services. Uterine and umbilical artery colour Doppler in second trimester do help in identifying severity of pregnancy induced hypertension and in other high risk group in 3rd trimester can be used as a routine screening examination in high risk pregnancies & contribute to improve maternal wellbeing & fetal health.

Keywords:uterine,umbilical, artery & I.U.G.R. &risk.

Study Designed: Observational Study.

1. INTRODUCTION

To reduce perinatal mortality and morbidity has been the main aim of radiologist and obstetrics for a few decades. These were managed by clinical assessment, pathological investigations and intrapartumlabour monitoring till the advent of USG[1]. Since the introduction of sonography in early 1960s. it has become a major tool for monitoring fetal growth from its detection as a fetal pole in the gestational sac upto is delivery in the intrapartum period[2].

Ultrasound waves are mechanical tension waves, like perceptible sound waves, however with a lot higher recurrence ultrasound waves are communicated through the body, creating reverberations at connection points of various acoustic impedance. The returning reverberations are gotten changed showed and recorded[3].

Clinical use of ultrasonography was presented in late 1950s and first 50% of 1960s. Normal step of ultrasonic assessment in obstetric was first attempted by Donald in mid 1960. It was understood that the mid-region of a pregnant ladies presents an optimal shape for use of transducer. Amniotic liquid offers an acoustic window to check the fetal parts appropriately.

The significant commitments in planning of gear and a portion of the demonstrative possibilities were those of teacher Ian Donald of Glassgow and Dr. Joseph Hellmer of Denver Donald found that, unidimensional "A" output could be utilized in the estimation of fetal biparietal width. This found let to the primary paper by Donald and his associates in 1958 corresponding fetal head size with span of pregnancy. The improvement of compound area examining added extraordinary significance to the examination of early pregnancy. Donald in 1963 showed that full bladder pushes the uterus somewhat out of the pelvis, giving a great medium to transmission of ultrasonic waves[4].

Fetal Doppler ultrasound is one of the freshest development to recognize IUGR Persistent wave (CW) Doppler utilizes a communicating gem and a recipient precious stone. A CW test can't segregate between various signs along the bar way. The CW transducer tests along the entire bean.

Beat wave (PW) Doppler is profundity specific and uses a similar precious stone to convey and get messages. Two layered imaging is fundamental with PW Doppler so the legitimate profundity can be chosen along the pillar way.

2. MATERIAL & METHOD

The present study was conducted at Index Medical College Hospital & Research Centre, Indore, M.P. from Mar 2021 to Feb 2022 on 50 pregnant women of high risk group for giving birth to a growth retarded babies.USG and Doppler studies was performed by using a convex array 0.57 m.m. R, 2-5.5 MHz multifrequency Doppler probe of Shimadzu SDU 2200 Colour Doppler ultrasound unit.

Ultrasonographic scanning of patients:

Ultrasonic examination consisted of measurements of BPD, AC, HC, FL, placental grading, amniotic fluid volume and fetal weight. The ultrasound examination was carried out from 22 weeks onwards, preferably those patients who had reported early in the second trimester with any of the known risk factors were taken in early and followed up in later months of pregnancy.

Criteria for selection of cases: A total of fifty cases were included in the study. These comprised some cases of pregnancy associated with maternal disorders thereby comprising the obstetric high risk group. These were selected from the antenatal clinics as well as the maternity wards. The selection of these was based on the following criteria:

1. The LMP (Last menstrual period) of the patient is well known.
2. The ability of the patient to come for a follow up at regular intervals.
3. The pregnancy was single.
4. The patient would preferably deliver in the same Hospital.
5. Known case of preeclampsia.

3. RESULTS

TABLE NO. 1: AGE WISE DISTRIBUTION OF CASES

S. NO	AGE GROUP IN YEARS	NO. OF CASES	PERCENTAGE
1.	16-20	12	12%
2.	21-25	44	44%
3.	26-30	30	30%
4.	31-35	10	10%
5.	36-40	04	04%
	TOTAL	100	100%

All the cases were between 18 and 40 years of age. Most of the cases were between 21 and 25 years of age comprising 44% of the total no. of cases included in this study.

TABLE NO. 02: FETAL OUTCOME IN RELATION TO ABNORMAL UTERINE, UMBILICAL, MIDDLE CEREBRAL ARTERY INDICES

S. No.	DOPPLER INDICES	NUMBER OF CASES	MODE OF DELIVERY	FETAL OUTCOME	
				SFD	IUGR
1.	Abnormal Uterine Artery	32	a. Vaginal Delivery – 10 b. Cesarean Section – 22	06	20
2.	Abnormal Umbilical Artery	24	a. Vaginal Delivery – 10 b. Cesarean Section – 14	08	12
3.	Abnormal Middle Cerebral Artery	12	a. Vaginal Delivery – 06 b. Cesarean Section – 06	04	06

TABLE NO. 03: PREDICTIVE VALUE OF DOPPLER STUDY FOR DETECTING ABNORMAL FETAL OUTCOME

S. No.	Doppler indices	No. Of findings				Sensitivity a/(a+c)	Specificity d/(b+d)	Predictive Value	
		TP (a)	FP (b)	TN (d)	FN (c)			Positive a/(a+b)	Negative (d /(c+d)
1.	UA Doppler Indices	26	06	10	58	31.6%	61.7%	82.6%	13.9%
2.	UMA Doppler Indices	20	04	14	62	23.9%	76.6%	84.7%	17.2%
3.	MCA Doppler Indices	10	02	14	74	12.1%	88.3%	82.8%	16.1%
TP = True positive, TN = True negative, FP = False positive, FN = False negative									

The sensitivity of uterine artery waveform in identifying IUGR in high risk group was 31.6% with a specificity of 61.7% and positive predictive value 82.6% and negative predictive value of 13.9%.The sensitivity of umbilical artery waveform in identifying IUGR in high risk group was 23.9% with a specificity of 76.6% and positive predictive value of 84.7% and negative predictive value of 17.2%.The sensitivity of Middle cerebral artery waveform in identifying IUGR in high risk group was 12.1% with a specificity of 88.3% and positive predictive value of 82.8% and negative predictive value of 16.1%.

4. DISCUSSION

In Doppler ultrasonograpy assessment of the principal part of uterine vein at the placental site is concentrated on in cases with one-sided placenta and two-sided uterine courses concentrated on the off chance that with focal placenta.

Doppler assessment of uterine and umbilical blood stream might give the early acknowledgment of high gamble pregnancies convoluted by maternal hypertension and fetal intra uterine development impediment. Unusual speed waveform acquired from uterine and umbilical corridors might assist with working on the viability of the pre-birth care and perinatal result as well[5].

The presence of a score and raised R.I. or on the other hand private investigator values with propelling incubation are marks of expanded uterine vasculature obstruction and disabled uterine blood stream. Doppler assessment of uterine course at 18-20 or 22-24 weeks of growth addresses a helpful prescient test in high gamble pregnancy and can likewise be utilized in pre-birth observation of a generally safe populace (Caforio L, Testa A.C. et al. 1999) [6].

Late standardization of unusual uterine velocimetry is an ideal prognostic variables in high gamble pregnancies in almost 50% of the cases (better perinatal result) determinedly strange

waveform are connected with the most exceedingly terrible pregnancy result (Soregarali M, Valcamonico A, Soregarali M. et al 2001) [7]. Doppler ultrasound of uterine conduit at 20-23 weeks can foresee basically a piece of extreme types of unfriendly pregnancy result.
Patients with scores had fundamentally higher paces of fetal development hindrance and cesarean conveyance as a result of fetal trouble and presumed that those with scores had essentially terrible pregnancy result (Weiner Z, Thaler I et al. 1992)[8]. Nonattendance or early vanishing of uterine conduit indent is related with less entanglements connected with uteroplacental inadequacy and typical birth weight, while their late and halfway vanishing or reciprocal presence will in general think twice about visualization.
Patients with tenacious respective scoring are especially in danger of creating P.I.H. or then again conveying S.G.A. child; they need expanded reconnaissance, and could be profited from prophylactic treatments (Harrington K, Cooper D et al. 1999)[9]. Early diastolic score in the stream speed waveform is a preferred indicator of toxemia over are ordinary impedance files. Two phase Doppler screening is useful in powerful expectation of toxemia.

5. CONCLUSION

To conclude USG is an important tool in the hands of sonologist for fetal growth monitoring. It is the necessity for obstetric management as an early and accurate diagnosis of fetal growth retardation will help to bring down the perinatal mortality and morbidity, which is our basic aim while providing good maternal and child health services. Uterine and umbilical artery colour Doppler in second trimester do help in identifying severity of pregnancy induced hypertension and in other high risk group in 3rd trimester can be used as a routine screening examination in high risk pregnancies & contribute to improve maternal wellbeing& fetal health.

6. REFERENCES

[1] Banu AA; Doppler velocimetry in the umbilical and middle cerebral arteries in fetuses with intrauterine growth retardation or fetal distress; FukokaIgakuZasshi, 1998; 99 (5) ; 133-44.
[2] Bahado Sigh RO, Kovanci E, Jeffres A; the Doppler cerebroplacental ratio and perinatal outcome in intrauterine growth restriction; Am J. Obstel Gynecol. 1999 –180 (3): 750-6.
[3] Bricker L. Neilson J.P. ; Routine Doppler ultrasound in pregnancy Cochrane data base system Rev, 2000 (2) CD 001-450.
[4] HershKouitz R, kingdom JC, Fetal cerebral blood flow redistribution in late gestation, identification of compromise in small fetuses with normal umbilical artery Doppler ultrasound Obstet. Gynecol, 2000; 15 (3) 200-12.
[5] Caforiol, Teste, A.C. et al. 1999; ultrasound Doppler observation in high risk pregnancy, Obst, Gynecol. 1999 ; 23, 637.
[6] Valcamonico A, Soregarali M. et al. : Doppler velocimetry in high risk pregnancy ultra sound. Obst. Gynecol. 2001; 16 (7), 412-8.
[7] Weiner Z., Thaler Z et al.: Assessment of abnormal uterine artery Doppler flow velocity waveforms ultrasound Obst. Gynecol1992 , 12(4): 260-4.

[8] Dubiel M. Breborowiez GH, Marshal K, Dudmandssor S; fetal adrenal and middle cerebral artery Doppler velocimetry in high risk pregnancy; ultrasound Obste, Gynecol. 2000 ; 16 (5) 414-8.

[9] Harrington K. Thomoson MO. Campbell S; Doppler fetal calculation in pregnancies complicated by pre eclampsia or delivery of a small for gestational age baby; 2-longitudinal analysis; Brit, J. of ObstetGynaecol, 1999 ; 106 (5) : 453.