Original Research Paper

Gynecology

STUDY OF FETAL DOPPLER AND NON-STRESS TEST (NST) IN OUTCOME OF INTRAUTERINE GROWTH RESTRICTION (IUGR)

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ABSTRACT

Aim and Objectives: To study the fetal monitoring by colour Doppler and Non-stress test in IUGR cases and its co-relation with perinatal outcome.

Materials and Method: Prospective observational study carried out on 100 antenatal patients of >32 weeks of gestational age diagnosed with IUGR attending the antenatal OPD in the department of Obstetrics and Gynecology of AVBRH, DMIMS, JNMC, Sawangi (M) Wardha (M.H) from August 2016 to July 2018. All patients diagnosed with IUGR underwent colour doppler and Non-stress test after doing routine examination and investigation and were divided into Four groups after fulfilling all the inclusion and exclusion criteria.

Results: 70% of the patients had reactive NST and 62% had normal colour doppler. 75% of patients belonged to low socioeconomic status. Maximum patients belonged to pre-eclampsia (45%) group. Studied showed that patients in group D were both the colour doppler and NST were abnormal NICU admission, low Apgar score and perinatal death were highest as compared to other three groups.

Conclusion: Both are useful in antepartum surveillance for normal healthy fetuses. Colour doppler detect chronic hypoxia earlier than NST which are helpful in timely delivery and management of the neonates.

KEYWORDS : Intrauterine Growth Restriction (iugr), Non-stress Test (nst)

INTRODUCTION-

"Intrauterine growth restriction (IUGR) is defined as an estimated fetal birth weight below the 10th percentile for gestational age and sex."[1] Intrauterine growth restriction is the major issue for Obstetricians as well as Pediatricians. Around 23.8% of newborns are affected world-wide and alone 75% of newborn in Asian countries. In India alone, around 8,90,000 perinatal deaths occur annually.[2] The incidence of low birth weight (LBW) and IUGR-LBW in Asian countries is seen in following order, highest being in Bangladesh, followed by that in India, Pakistan, Sri Lanka, Cambodia, Vietnam and the Philippines, Indonesia and Malaysia, Thailand, and the lowest in the People's Republic of China (PRC).[1]

Therefore the main objective of antenatal care is to identify the compromised IUGR fetuses and to allow timely intervention and management,[3] and goals include early detection of fetal compromise, prevention of unnecessary preterm delivery and intrauterine death. Various non-invasive tests which can predict and assess the high risk pregnancies like Gravidogram, Clinical examination, NST, Doppler flow studies, DFMR (Daily fetal movement count),Biophysical profile (BPP),Contraction stress test (CST) give us cardinal information regarding the fetus in utero.[4] Hence, this study was done to determine the importance of NST and Colour Doppler in IUGR and to evaluate the results in term of perinatal outcome.

MATERIAL AND METHODS:-

Prospective observational study carried out on 100 antenatal patients of >32 weeks of gestational age diagnosed with IUGR attending the antenatal OPD in the department of Obstetrics and Gynecology of AVBRH, DMIMS, JNMC, Sawangi (M) Wardha (M.H) from August 2016 to July 2018.

INCLUSION CRITERIA-

- All pregnant women with > 32 weeks of gestational age with IUGR registered to antenatal OPD
- Single fetus with cephalic presentation
- Patient not in active phase of labour.

EXCLUSION CRITERIA-

- Multiple fetal pregnancy
- Fetal congenital anomalies
- Medical diseases like Diabetes mellitus
- Patients present with accidental hemorrhage, impending dehiscence of scar, or Cord Prolapse

- **METHOD-** All the patients diagnosed with IUGR through ultrasonography underwent for colour doppler and Non-Stress Test after due consent. Colour doppler was done by transducer frequency of (LOGIQ F-8)3.5MH$_z$ and medium filter, patient was in supine position and fetus in resting state. The flow velocity waveforms of Umbilical artery, Uterine artery (Left and Right) and Middle cerebral artery were recorded, there Pulsatility index (PI), Resistance index (RI) and S/D ratio of all the arteries were calculated and cut off values are set.

Normal Obstetrics doppler parameters range from 32- 40 weeks gestational age are-[5]

ARTERIES	RESISITANCE INDEX	PULSATILITY INDEX	SYSTOLIC/DIASTOLIC RATIO (S/D)
Uterine arteries	0.375-0.355	0.705-0.663	1.5-2.5
Umbilical artery	0.592-0.519	0.980-0.828	2.67-2.18
Middle cerebral artery	0.801-0.669	1-2.1	4-6

Non-Stress test was advice to the patient diagnosed with IUGR according to the severity, Procedure was explained to the patient and NST was taken for 20 minutes and was observed as reactive and non-reactive according to following features.

1. Fetal baseline heart rate ranges from (110-160bpm)
2. Variability in baseline of fetal heart rate
3. Presence of at least 2 or more acceleration
4. Fetal heart rate with no deceleration.

On the basis of colour Doppler and NST studies, the patients of IUGR were divided into 4 groups based on last doppler and NST findings at least 7 days prior to delivery.

- Group 1- (Normal colour doppler and reactive NST)
- Group 2- (Normal colour doppler and non-reactive NST)
- Group 3-(Abnormal colour doppler and reactive NST)
- Group 4-(Abnormal colour doppler and non-reactive NST)

In all the four groups following perinatal outcome were recorded and statistical analysis was done:-

- Mode of delivery
- Apgar score at 1and 5 minutes
- Birth weight

- NICU admission
- Statistical analysis was done by using descriptive and inferential statistics using chisquare test and students unpaired t test and p<0.05 is considered as level of significance.

RESULTS

Table no 1 shows, the maternal characteristics out of 100 patients 52% of patients were primigravida and 48% patients were multigravida and 66% of patients were booked case, mean age at the time of delivery was 25.25±4.26 years. According to Kuppuswami Classifications majority of the patients 60% belonged to class IV. Most common risk factors were preeclampsia 45%, while the other risk factors include anemia 31%, BOH 3%, oligohydromnious 15%, and 6% were previous LSCS.

In table no 2- Out of 62 patients who had colour doppler findings normal, 50(50%) had NST findings reactive and belongs to group 1 and 12% had NST non-reactive were in group 2 and out of 38 patients who had colour doppler findings abnormal, 20(20%) had NST reactive were in group 3 and 18(18%) had NST test non-reactive belongs to group 4.

As shown in table no 3 in group 1, 8% patients had instrumental deliveries, 14% underwent LSCS, 62% had normal vaginal delivery, 14% had preterm vaginal delivery (PTVD), 2% had VBAC deliveries. In group 2, 50% underwent LSCS, 41.67% delivered vaginally, and 8.33% had PTVD. In group 3, 5% patients had instrumental deliveries, 20% underwent LSCS, 50% having normal vaginal delivery (NVD), 10% had PTVD, and 15% had VBAC deliveries. In group 4, 100% patients underwent LSCS. Statistically significant difference was found in mode of deliveries among four groups of patients p-value=0.0001.

As shown in table 4 in group 1, 12% had respiratory distress syndrome (RDS), and 4% had meconium stain liquor (MSL) and 18% had NICU admission. In group 2, 33.33% had RDS, each 8.33% had Apgar <7 at 1 and 5 minute, 8.33% had MSL, and 50% had NICU admission. In group 3, 40% had RDS, 5% had Apgar score <7 at 1 minute, 5% had MSL, 55% had NICU admission and 5% had neonatal death. In group 4, 72.22% had RDS, 55.56% had Apgar score < at 1 minute, 38.89% had Apgar score < 7 at 5 minutes, 77.78% had NICU admission and 22.22% had neonatal death (p=0.0001).

TABLE 1: Maternal Characteristics

Maternal Characteristics	No of patients	Percentage (%)
Primigravida	52	52
Multigravida	48	48
Mean age at time of delivery	25.25±4.26 years	-
Booked	66	66
Class IV	60	60
Preeclampsia	45	45

TABLE2: Correlation Of Colour Doppler And Non Stress Test

Colour Doppler Findings	Non Stress Test(NST)		
	Reactive	Non-reactive	
Normal	50(50%)	12(12%)	p=0.003,S
Abnormal	20(20%)	18(18%)	
Total	70(70%)	30(30%)	

TABLE 3: Distribution of patients according to mode of delivery in all the four groups

Mode of delivery	Group 1	Group 2	Group 3	Group 4	No of patients
Instrumental	4(8%)	0(0%)	1(5%)	0(0%)	5(5%)
LSCS	7(14%)	6(50%)	4(20%)	18(100%)	35(35%)
NVD	31(62%)	5(41.67%)	10(50%)	0(0%)	46(46%)
PTVD	7(14%)	1(8.33%)	2(10%)	0(0%)	10(10%)
VBAC	1(2%)	0(0%)	3(15%)	0(0%)	4(4%)
Total	50(100%)	12(100%)	20(100%)	18(100%)	100(100%)
	p-value=0.0001, S				

TABLE 4: Comparison Of All Four Groups For Perinatal Outcome

Perinatal Outcome	Normal Doppler		Abnormal Doppler		p-value
	Reactive NST Group 1	Non-reactive NST Group 2	Reactive NST Group 3	Non-reactive NST Group 4	
Respiratory Distress Syndrome	6(12%)	4(33.33%)	8(40%)	13(72.22%)	0.0001,S
Apgar Score <7 at 1 min	0(0%)	1(8.33%)	1(5%)	10(55.56%)	0.0001,S
Apgar Score <7 at 5 min	0(0%)	1(8.33%)	0(0%)	7(38.89%)	0.0001,S
Meconium Stain Liquor	2(4%)	1(8.33%)	1(5%)	8(44.44%)	0.0001,S
NICU Admission	9(18%)	6(50%)	11(55%)	14(77.78%)	0.0001,S
Neonatal Death	0(0%)	0(0%)	1(5%)	4(22.22%)	0.0001,S

DISCUSSION

On comparing colour doppler and NST we found that where both doppler and NST were abnormal, as colour doppler showed fetal hypoxic changes earlier than NST giving the lead time which is very important as babies can be delivered in this period under the coverage of steroid. In present study out of 100 patients, maximum patients were in the age group of 23-27 years with mean age of 25.25±4.26 years which is similar to the study done by Nisha Choudhury et al[6] found maximum number of patient at the age group of 26-30 years with a mean age 28.68±4.89 years. In our study it was found that 66 (66%) of the patients were booked and 34 (34%) were unbooked. which is matching with the study done by Swati Grag et al [7] in which out of 101 patients 74 (73.3%) patients were booked and 27 (26.7%) patients were unbooked. In our study 25.25±4.26 years were the mean gestational age at the time of delivery and maximum numbers of the patients were pre-eclampsia 45% with p value-0.41 which is comparable to the study done by Dharamvijay M N et al [8] showed most common risk factor of IUGR is pre-eclampsia 64% (n-53).

On statistical analysis it was found that LSCS were significantly higher in group 4 as compare to group1 with p-value=0.0001 which is comparable to the study done by Vijaya Subramanian et al [9] in which 46.27 % of cases ended up in C-section in group III were both tests were abnormal and (90%) had cause of fetal distress and p value-0.001 which was statistically significant. Our study shows that in group 4 were both the tests were abnormal perinatal outcome was poor in terms of RDS, MSL, low birth weight, Apgar <7, NICU admission and neonatal death, though doppler was abnormal in both group 3 and 4 perinatal outcome was better in group 3 suggest that neonate was significantly more compromised when both test were abnormal and are statistically significant. Comparable to the study done by done by Anand R. Tambat et al [10] found that in group A perinatal outcome was better with 100% survival rate with Apgar <7 in 5 minutes were seen in 36.8% of babies, with 50% of NICU admission, while in group D it had worst perinatal outcome with 100% NICU admission with 50% perinatal mortality and p value-<0.05 and was significant for NICU admission and perinatal outcome when group A and D was compared. Study done by Kanan A.Yelikar et al [4] found that maximum number of the neonate had meconium stain liquor, apgar ≤ 7 and NICU admission were more in group III and group IV which are statistically significant. In group I 7.3% babies were admitted to NICU with no perinatal death were as in group IV NICU admission were 100% with 33.3% of perinatal death.

CONCLUSION

Our study suggest that colour doppler detect chronic hypoxia earlier than non-stress test which are helpful in timely delivery and management of the neonates. An abnormal colour doppler with

non-reactive NST showed worst perinatal outcome than when either of them are abnormal.Non-stress test still has its important because it is easy to use, cost effective, required less time. While colour doppler required costly equipment, highly skilled and experienced person.

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