Relationship of the Findings of Colour Doppler and Non-Stress Test with the Perinatal Outcome among the Cases of Intra-Uterine Growth Restriction

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Abstract

Introduction: Intrauterine growth restriction is the second most common cause of perinatal mortality and morbidity after prematurity. Etiologies can be maternal, fetal or placental. The correct detection of compromised IUGR fetus to allow timely intervention is a main objective of antenatal care. Many of IUGR patients presents in their third trimester for the first time for antenatal examination. Such patients warrant a highly sensitive and specific diagnostic test which can be non-invasively applied on a large scale. Apart from various other non-invasive tests like USG, NST, Doppler flow studies give us vital information regarding the fetus in utero. Hence the present study is aimed at exploring the association of colour Doppler and non-stress test findings with the perinatal outcome in the fetuses with IUGR. **Aim:** To study relationship of Doppler and NST with perinatal outcome in IUGR cases. **Material and Methods:** A Prospective observational study was conducted on 70 patients of IUGR from August 2013 to November 2015 in Department of Obstetrics and Gynaecology , Dr. Vasantrao Pawar Medical College, Hospital & Research Center. Inclusion criteria: Patients with diagnosed singleton pregnancies with IUGR at gestational age more than 32weeks not in labour. Exclusion criteria: Patients with congenital anomalous fetus, diabetes or acute placental insult. Patients were followed up with serial Umbilical artery Doppler and NST. Perinatal outcome was correlated with the last Doppler and NST within 7days prior to delivery. **Results:** Perinatal outcome is worst in patients with both NST and Doppler are abnormal and best among patients with both normal NST and Doppler. **Conclusion:** Doppler predicts fetal compromise earlier as compared to NST.

Keywords: Intrauterine Growth Restriction, Non-Stress Test, Umbilical Artery Doppler

1. Introduction

Intra-uterine growth restriction (IUGR) is defined as "fetal weight less than 10th percentile of predicted for gestational age"[1]. It is the second leading cause of perinatal morbidity and mortality followed by prematurity with incidence estimated to be approximately 5% to 7 %[2].

The known association of etiologies involves fetal, placental and / or maternal factors. IUGR is associated with an increased risk of perinatal mortality, morbidity and impaired neurodevelopment. There is strong association between IUGR and the later development of metabolic syndromes comprising arterial hypertension, coronary artery diseases, dyslipidemia, visceral obesity, impaired glucose tolerance, type 2 diabetes mellitus and many other diseases[3].

The correct detection of compromised IUGR fetus to allow timely intervention is a main objective of antenatal care[4]. Many of IUGR patients presents in their third trimester for the first time for antenatal examination. Such patients warrant a highly sensitive and specific diagnostic test which can be non-invasively applied on a large scale[5]. Apart from various other non-invasive tests like USG, NST, Doppler flow studies give us vital information regarding the fetus in utero[6].

Hence the present study is aimed at exploring the association of colour Doppler and non-stress test findings with the perinatal outcome in the fetuses with IUGR.

2. Materials and Methods

A prospective observational study of "Relationship of

the findings of colour doppler and non-stress test with the perinatal outcome among the cases of intra-uterine growth restriction" was undertaken. This study has been done from August 2013 to November 2015.Seventy (70) patients diagnosed with intrauterine growth restriction pregnancies were included in the study after fulfilling the inclusion criteria and obtaining written informed consent. Study was conducted in Obstetrics and Gynaecology department at Dr. Vasantrao Pawar Medical College, Nashik.

3. Inclusion Criteria

- All cases of IUGR defined as "fetal weight less than 10th percentile of predicted for gestational age".
- Gestational age of 32 weeks or more.
- Singleton pregnancy.
- Patients not in active labor.

4. Exclusion Criteria

- Documented evidence of Congenital anomalies in fetus.
- Diabetic pregnant females.
- Patients with acute insults of placenta like abruptio placentae, scar dehiscence or cord prolapse.
- Patients not willing to give written informed consent.

In the study 70 patients after being diagnosed with IUGR were followed with colour Doppler of Umbilical artery and Non-stress test. Patients were divided in four groups based on last Doppler and NST findings at least 7 days prior to delivery:-
Group A : Reactive NST and normal Doppler.
Group B : Reactive NST and abnormal Doppler.
Group C : Non-reactive NST and normal Doppler.
Group D : Non-reactive NST and abnormal Doppler.

Among all the 4 groups, perinatal outcome was assessed by following parameters:
- Mode of delivery.
- Apgar score at 0, 1, 5 minutes.
- Birth weight.
- NICU admission.
- NICU stay duration.
- Neonatal Morbidity/Mortality.

5. Results

Maternal characteristics of the population studied are shown in Table No.1 .Majority (57.1%)of the study population were multigravida with a mean age of 24years. Most common risk factors associated were Preeclampsia in 24.3% while other major risk factors included oligohydroamnios in 20%, Hypothyroidism in 8.6% and anaemia in 7.1%.

Table 1. Maternal Characteristics

Maternal Characteristics	Number	Percentage
Mean Age	24 years	-
Primigravida	30	42.9
Multigravida	40	57.1
Meangestational age at diagnosis	34.02 weeks	-
Mean gestational age at delivery	37.42 weeks	-

There were 38(54.3%) patients in Group A who had both NST and Doppler normal, 18(25.7%) patients were in Group B who had normal NST and abnormal Doppler, 6(8.6%) patients in Group C had normal Doppler and abnormal NST and 8(11.4%) patients had both NST and Doppler abnormal.

Table No. 2 shows mode of delivery and perinatal outcome in different groups. Group A with both NST and Doppler normal had best perinatal outcome with 100% survival associated with Apgar <7 at 5 min only in 36.8% of babies. NICU admission was seen in 50% of babies with 100% survival. While Group D had worst prognosis with 100% babies admitted in NICU among whom 50% resulted in perinatal mortality.

Reactive NST was noted in 56 patients among whom 44.6% were normal healthy babies while only 1(1.8%) baby had perinatal death. In Non-Reactive NST 6(42.9%) babies had perinatal mortality.

Among patients with normal Doppler 50% had normal healthy babies and perinatal death in only 4.5% while in patients with abnormal Doppler 71.4% of babies had perinatal death.

There was statistical significance between Group A and Group D regarding NICU admission(p<0.05) and perinatal outcome(p<0.05).

6. Discussion

Our study shows that in Group D with both NST and Doppler abnormal perinatal outcome was worst in terms of low birth weight, Apgar less than 7, NICU admission and high perinatal mortality. Inspite of the fact that Doppler was abnormal in both Groups B and Group D, perinatal outcome was significantly better in Group B suggesting that fetus was significantly more compromised when both test were abnormal as compared to only Doppler abnormal.

Table 2. Group Comparisons

	Group A (N=38)	Group B (N=18)	Group C (N=6)	Group D (N=8)
Mode of Delivery				
Vaginal Delivery	22(57.9%)	7(38.9%)	2(33.3%)	7(87.5%)
Caesarean Delivery	16(42.1%)	11(61.1%)	4(66.7%)	1(12.5%)
Perinatal Outcome				
Survival	38(100%)	17(94.4%)	4(66.7%)	4(50%)
Perinatal Mortality	0	1(5.6%)	2(33.3%)	4(50%)
Neonatal Characteristics				
Average birth weight	1.8kgs	1.73kgs	1.87kgs	1.49kgs
Apgar <7 at 5min	14(36.8%)	9(50%)	3(50%)	6(75%)
NICU admission	19(50%)	12(66.7%)	3(50%)	8(100%)
Average Duration of NICU stay	18.11 days	12.42 days	4.67 days	12.63 days

Similarly when Group B with Doppler abnormal was compared with Group C with NST abnormal, it was found that perinatal outcome was better in Group B which suggests that Doppler predicts fetal compromise earlier in course as compare to NST which becomes abnormal later in relatively more compromised foetuses.

Gomathi et al.[7] conducted a similar study on 90 patients which showed worst perinatal outcome in Group D with perinatal mortality of 60%. Apgar<7 at 5 minutes was noted in 35% of babies in Group D and 75% of NICU admissions. While Group A with best perinatal outcome had perinatal death in only 5.2% of babies. Apgar<7 at 5 minutes was seen only in 5.3% babies, mean birthweight was 2215 grams and 39.5% babies required admission to NICU.

Radhika et al.[8] conducted a prospective study to evaluate 55 pregnancies concluded that Group D had perinatal death in 50% of the babies, NICU admission in 87.7% of babies born to patients in this group with low birth weight(1415gms) and lesser mean gestational age at delivery i.e 34.3 weeks. While Group A had mean gestational age at delivery of 37.5 weeks, mean birth weight of 2179 grams, Apgar<7 at 5 minutes in 5% and perinatal deaths in 5% of babies.

Yelikar et al.[6] studied 189 patients concluded that Group A had best perinatal outcome with mean gestation of delivery of 37.3weeks, NICU admission in 7.3% babies with mean birth weight of 2288 grams and no perinatal deaths. Whereas Group D patients were delivered at mean gestation of 34.6 weeks with 100% NICU admissions and perinatal deaths in 33.3% of the babies.

7. Conclusion

Our study suggests that both Doppler and NST were more effective in predicting a normal healthy fetus. Fetal compromise was greater when both Doppler and NST were abnormal. Moreover, when NST was abnormal, the fetuses were more compromised than when only Doppler was abnormal. This suggests that Doppler detects fetal compromise earlier than NST which is very helpful in timely delivery and management of neonates.

8. References

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