



COMPARATIVE STUDY ON CARDIOTOCOGRAPHY VS USG DOPPLER IN THE OPTIMAL MANAGEMENT OF INTRA UTERINE GROWTH RESTRICTED FETUSES

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BACKGROUND:

The assessment of the growth of the fetus, health and their development are being thought to be the standard antenatal care. IUGR is defined as babies whose birth weight is being below the tenth percentile of the average for the corresponding gestational age. Incidence of IUGR in the term gestation babies is 5% where as Incidence of IUGR in the preterm gestation babies is still higher - 15%. The IUGR babies are at greater risk for neonatal morbidity and mortality^(Ref.No-2). This higher rate of neonatal morbidity and mortality necessitates earlier detection so that ante partum fetal surveillance methods can be applied appropriately to the infants and helpful for the babies to get proper institutional care at all levels and the neonatal outcome can be improved (REFNO-1).

We aim to find the risk factors; thereby the outcome can be improved by timely intervention. It is the intervention timing that going to be of a big challenge. The surveillance methods should be simple, safe, cheap, readily available and easily applicable to the study group. And more importantly should provide information at the right time so that the appropriate management can be enforced to effectively reduce the morbidity and mortality. Ultrasound Doppler, CTG (cardiotocogram tracing), amniotic fluid volume measurement, and assessing the biophysical profile are the various available modes of the fetal ante partum surveillance methods, among which the CTG is more popular and the DOPPLER has been increasingly used to identify the risk more earlier^(Ref.No-3). Both are helpful in identifying the fetal compromise, thereby helping in providing appropriate timely intervention. In this study, the CTG and the ultrasound Doppler methods of ante partum surveillance are been applied to the group of IUGR fetuses and compared their predictability of the risk and improvement in the neonatal outcome.

Aim Of The Study

The aim of this study is to compare the efficacy of Doppler velocimetry and Cardiotocography in the surveillance of Intra uterine growth restricted fetuses and hence their capacity to predict adverse neonatal outcome.

MATERIALS AND METHODS

Study Design Cross sectional - prospective study

Period Of Study 6 months

Place Of The Study

Government Dharmapuri Medical College Hospital
Department of Obstetrics and Gynecology.

Collaborating Department

Department of Radiology & Pediatrics

Study Subject

100 antenatal mothers who presents to the department of obstetrics and gynecology with intra uterine growth restricted fetus.

Inclusion Criteria

Antenatal mothers of more than 30 weeks gestational age with singleton fetus with intra uterine growth restricted, abdominal circumference less than 10th percentile corresponding to the gestational age. Willing to participate in the study

Exclusion Criteria

Fetal malformation chorioamnionitis

METHODOLOGY :

- Antenatal women were randomized into 2 groups.
- GROUP I monitored with Doppler and cardiotocography. Doppler ultrasound done at entry into study and then proceeded weekly for the first 3 weeks. If normal, then done every 2 weeks and if abnormal, then continued weekly. Fetus with abnormal Doppler findings are terminated according to the severity and gestational age.
- Cardiotocography on alternate days for 20 minutes duration. If found non reactive, then pregnancy is terminated.
- GROUP 2 monitored with cardiotocography alone
- Done on alternate days for 20 minutes duration. If found non reactive, then pregnancy is terminated.
- The mode of delivery and the baby details are noted. Sex of the baby, birth weight, one minute and five minute APGAR score, whether NICU admission is done. Baby is followed up for any occurrence of neonatal complications. Length of the NICU stay is noted.

RESULTS

Table - 1 : Comparison Of Age

Age	Doppler + CTG	CTG
<20	8	9
21 - 30	37	38
> 30	5	3

In Doppler CTG group, 74 % of the antenatal mothers fall in 21- 30 age group. In CTG alone group, 76 % of the antenatal mothers fall in the 21- 30 age group.

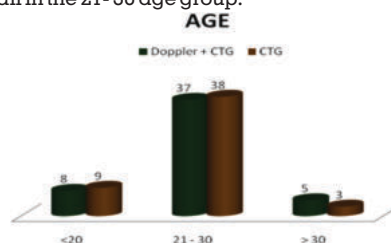
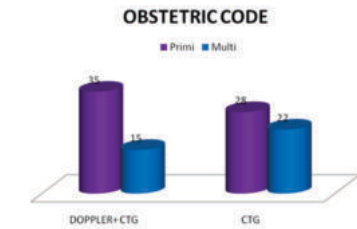


Figure-1 : Comparison Of Age:

Table – 2 : Obstetric Code:

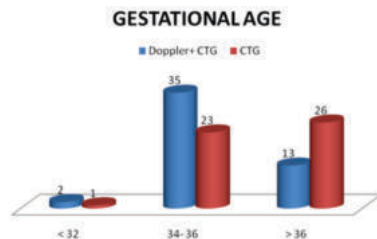
OBSTETRIC CODE	DOPPLER+ CTG	CTG
Primi	35	28
Multi	15	22

In Doppler CTG group, 56 % are primigravida and in CTG alone group, 70 % are primigravida and rest are multigravida.

**Figure – 2 : Obstetric Code:****Table – 3: Gestational Age:**

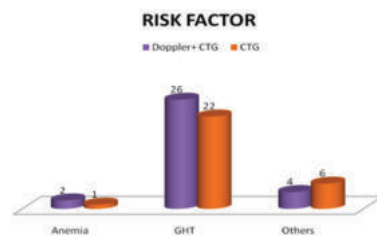
Gestational age	Doppler+ CTG	CTG
< 32	2	1
34- 36	35	23
> 36	13	26

In Doppler CTG group, 70 % of the cases were terminated in 34- 36 gestational age. In CTG alone group, 52 % were terminated in 34-36 gestational age.

**Table – 4: Risk Factor**

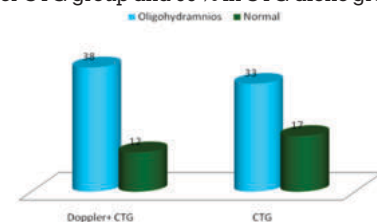
Risk factor	Doppler+ CTG	CTG
Anemia	2	1
GHT	26	22
Others	4	6

52 % of the antenatal mothers in Doppler CTG group and 44 % in CTG alone group were having gestational hypertension as risk factor associated with IUGR.

**Figure:4 - Risk Factor****Table – 5: Liquor**

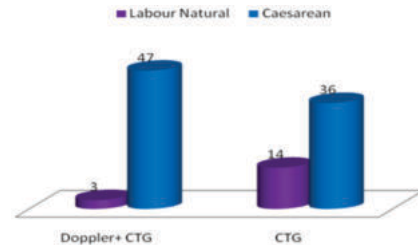
Liquor	Doppler+ CTG	CTG
Oligohydramnios	38	33
Normal	12	17

In Doppler CTG group, oligohydramnios was associated in 56 % of Doppler CTG group and 66 % in CTG alone group.

**Figure: 5 Liquor****Table – 6 : Delivery Mode**

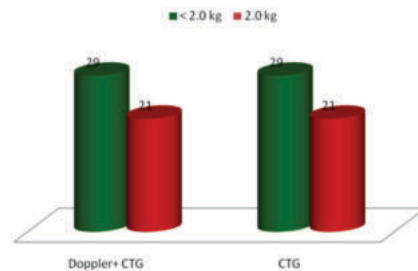
Delivery mode	Doppler+ CTG	CTG
Labour Natural	3	14
Caesarean	47	36

94 % in Doppler CTG group and 72 % of the CTG alone group underwent cesarean section.

**Figure : 6: Delivery Mode****Table – 7 : Birth Weight**

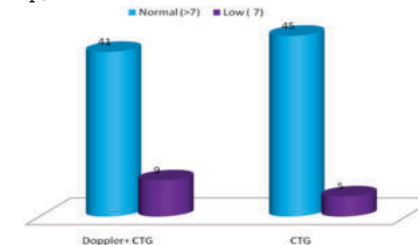
Birth weight	Doppler+ CTG	CTG
< 2.0 kg	29	29
2.0 kg	21	21

58 % in both the groups had birth weight < 2 kg

**Figure – 7 : Birth Weight****Table – 8: APGAR**

Apgar	Doppler+ CTG	CTG
Normal (>7)	41	45
Low (7)	9	5

In Doppler CTG group, 82 % had APGAR > 7 and in CTG alone group, 90 % had APGAR > 7

**Figure : 8 – APGAR****Table-9 NICU**

NICU	Doppler+ CTG	CTG
Yes	48	40
No	2	10

In Doppler CTG group, 96 % got admitted in NICU and In CTG alone group, 80 % got NICU admitted.

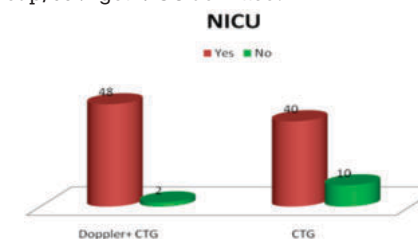
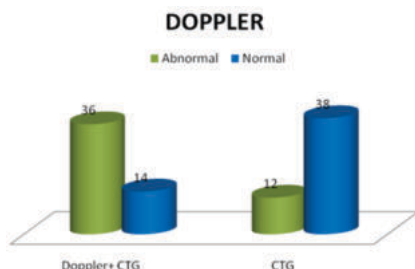
**Figure – 9: NICU**

Table – 10: Doppler

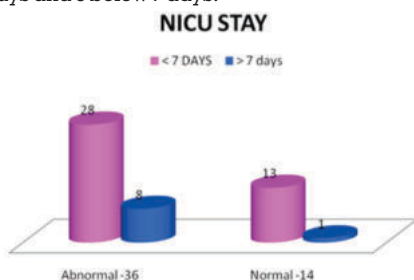
Doppler	Doppler+ CTG	CTG
Abnormal	36	12
Normal	14	38

In Doppler CTG group, the hypoxic changes were picked up in 36 among 50 and in CTG alone group, it was only 12 out of 50 were non reactive.

**Figure –10: DOPPLER****Table – 11 : Doppler With Ctg Group**

NICU stay	Abnormal (36)	Normal (14)
< 7 DAYS	28	13
> 7 days	8	1

In Doppler CTG group, among the 36 detected, 28 had NICU stay below 7 days and 8 had stay above 7 days. In CTG alone group, among the 12 non reactive fetuses, 9 had NICU stay above 7 days and 3 below 7 days.

**FIGURE: 11: Doppler With Ctg Group****Table – 12: CTG group**

NICU STAY	REACTIVE	NON REACTIVE
< 7 DAYS	33	3
> 7 DAYS	5	9

**Figure : 12 CTG GROUP**

DISCUSSION

Intra uterine growth restricted fetuses are more associated with the neonatal morbidity and mortality. It's the early detection of the hypoxic changes and timely intervention will have a dramatic change in the improvisation of the neonatal outcome. There are various methods of surveillance tools available to monitor intra uterine growth restricted fetuses. In this study, the Doppler velocimetry and cardiotocography are been compared regarding their efficacy in the surveillance and optimal management of IUGR fetuses and their predictability of adverse neonatal outcome. The outcome parameters considered in this comparative study are

cesarean section rate, birth weight, APGAR scores and length of NICU stay of the IUGR babies.

The study population were divided into 2 groups, with 50 antenatal mothers in each group. In first group, IUGR was monitored by both Doppler and cardiotocography. In second group, by only cardio tocography. If any abnormality detected, the IUGR mothers are been managed as per protocol. Delivery mode details and the baby details were been recorded. They were followed till both the mother and baby were discharged. All the data documented were analyzed by chi square test.

Age is an independent risk factor. In this study, the majority of the study population falls in 21 - 30 yrs age and the mean is 25 yrs on both the group. This is comparable with the mean age of 26.8yrs in study by Dharmavijaya ET AL^(REFNO-5). The working group are very less in this study. Only 26 % in Doppler CTG group and 28 % in CTG alone group belongs to the working group.

IUGR fetuses need higher institutional level care and better surveillance protocol. In this study, had 68 % of the Doppler CTG group and 56 % of the CTG alone group were referral cases from various primary level health centers for want of better management and higher level neonatal care and good NICU setup.

Among the study population, 56 % of the Doppler CTG group and 44 % of the CTG alone group belong to primi gravida category. In a similar study by dharmavijaya et al, it was 38.5 % were primi gravida. There are various causes and risk factors associated with intra uterine growth restriction, among which, in this study, the majority of the study group was associated with gestational hypertension. 52 % of the Doppler CTG group and 44% of the CTG group had gestational hypertension associated. Gestational hypertension is a major risk factor associated with IUGR and the main pathophysiology leading to IUGR is utero placental insufficiency.

All cases of gestational hypertension should be suspected of intra uterine growth restriction and be monitored cautiously. The gestational hypertension should be under close surveillance and IUGR can be detected earlier. And adequate BP control can have an added advantage in improvising antenatal care and optimal management.

Oligohydramnios is more commonly associated with intra uterine growth restriction. The mechanism behind oligohydramnios is uteroplacental circulation insufficiency and reduced renal perfusion. This is consistent with the findings observed in this study. In Doppler CTG group, 76 % and in CTG alone group 66 % were associated with oligohydramnios.

The mean gestational age in this study is 35 weeks. 35 out of 50 in the Doppler CTG group were terminated at 34-36 weeks with antenatal steroids administration based on the Doppler early hypoxic changes detected. In CTG alone group, 26 out of 50 were terminated > 36 weeks and 22 were terminated at 34-36 weeks.

This show that the Doppler identifies the early hypoxic changes and act as an effective surveillance tool when compared to CTG which identifies at later period in similar studies conducted by DHARMAVIJAYA ET AL showed the mean gestational age of birth as around 34 weeks. In study by HALEY ET AL^(REFNO-4), it was 38-39 weeks.

Mode of delivery holds very important in the management of IUGR fetuses. In this study, 94 % in Doppler CTG group and 72 % in the CTG alone group underwent cesarean section.

Cesarean section rate is higher in both the study groups. The birth weight observed in this study was 58 % below 2 kg in both the groups. In similar study by CHAKRABORTY ET AL^(REFERENCE-6), the mean birth weight was 2.6 kg and by HALEY ET AL, it was 2.5 kg.

In this study, 82 % of the Doppler CTG group, and 90 % of the CTG alone group had APGAR at birth > 7. This is comparable to the mean APGAR in the study conducted by HALEY ET AL was 9. The early detection of the hypoxic insults help us to provide better surveillance and timely intervention, thereby improve the neonatal outcome.

The babies born with low APGAR had longer NICU stay and more associated with neonatal complications. In this study, in CTG alone group, 10 out of 50 had longer NICU stay whereas in Doppler CTG group, only 2 out of 50 had longer NICU stay > 7 days. This proves that Doppler is found more superior to cardiotocography as an efficient surveillance tool in IUGR and in predicting adverse neonatal complications and improving the neonatal outcome.

CONCLUSION

- The doppler velocimetry and cardiotocography are primary monitoring tools in the optimal management of intra uterine growth restricted fetuses
- Cardiotocography identifies only the acute events whereas doppler velocimetry identifies the chronic hypoxic insults more earlier.
- Doppler velocimetry when compared with cardiotocography is more advantageous in the surveillance of intra uterine growth restricted fetuses and in early decision making.
- Doppler velocimetry is superior to cardiotocography in providing information needed for timely intervention, thereby reducing perinatal morbidity and mortality to a greater extent.
- Thus, doppler velocimetry is more efficient than cardiotocography in the surveillance of intra uterine growth restricted fetuses and to predict the adverse neonatal outcome.

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