ORGINAL ARTICLE

Cardiotocography In Labour And Fetal Outcome

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ABSTRACT

Background: Routine and continuous electronic monitoring of Fetal Heart Rate (FHR) in labour has become an established obstetric practice in high-risk pregnancies in developed countries. However, the same may not be possible in developing countries where antenatal care is inadequate with a large number of high-risk pregnancies and inadequate health care provider to patient ratios.

Aim: The objective of this study was to evaluate the admission cardiotocogram (CTG) in detecting fetal hypoxia at the time of admission in labour and to correlate the results of the admission CTG with the perinatal outcome in high-risk obstetric cases.

Materials and Methods: This was a prospective observational study was conducted in the labour from January 2018 to June 2018. The study included high-risk pregnant women, the emergency or outpatient department with a period of gestation ≥36 weeks, in first stage of labour with foetus in the cephalic presentation. All women were subjected to an admission CTG, which included a 20 minute recording of FHR and uterine contractions.

Results: Sixty patients were recruited in the study. The majority of women were primigravida in the 21-30 years age group. Pregnancy-Induced Hypertension (PIH) (5.6%), Oligohydramnious (8.3%) and Premature Rupture Of Membranes (PROM) (3.3%) were the major risk factors. The admission CTG were 'reactive' in 71.6%, 'equivocal' in 21.6% and 'ominous' in 6.6% women. Incidence of foetal distress, moderate-thick meconium stained liquor and Neonatal Intensive Care Unit (NICU) admission was significantly more frequent among patients with ominous test results compared with equivocal or reactive test results on admission. Incidence of vaginal delivery was more common when the test was reactive.

Conclusion: The admission CTG appears to be a simple non-invasive test that can serve as a screening tool in 'triaging' foetuses of high-risk obstetric patients in developing countries with a heavy workload and limited resources.

Keywords: Cardiotocography, admission test, foetal distress, foetal hypoxia, perinatal outcome

Introduction:

Surveillance of the foetus during labour is important to ensure the delivery of a healthy baby in good condition with minimum of Intervention (1). Although the vast majority of foetuses cope well during labour, the journey through the birth canal is stressful and the foetus may mount a stress response. Foetuses with uteroplacental insufficiency develop hypoxia prior to entering labour.

- Cardiotocography is a recording of the fetal heartbeat and uterine contractions during labour. CTG monitoring is widely used to assess' fetal well being.
- Such an approach is introduced to prevent neurological injury including cerebral palsy (2). For this purpose electronic fetal monitoring has widely been adopted (3). Although with intermittent auscultation the baseline fetal heart rate can be measured, other features of the fetal heart such as baseline variability, accelerations and deceleration are difficult to quantify (4). As a consequence some authors attribute a considerable decrease in the overall perinatal mortality to the use of CTG and today CTG is the first line investigation for Ante and Intra partum fetal assessment (5). Routine electronic monitoring of FHR in labour has become established obstetric practice in developed countries (6).
- The objective of this study was to evaluate the prediction value of the CTG in labour in detecting fetal hypoxia and to correlate the results of the CTG during labour with perinatal outcome. In busy labour wards with few monitors selection of the patients for continuous monitoring is necessary (7).
- Ingemarsson et al(8) described an alternative method of monitoring FHR during labor to pick the woman apparently at risk whose foetuses were compromised on admission or were likely to become compromised in labour-Admission Test (AT)(4).
- The admission CTG is short, usually 20 minute, recording of the FHR immediately after admission to the labour ward. The main justification for admission CTG is that the uterine contractions of the labor put stress on the placental circulation; an abnormal tracing indicates a deficiency and hence identifies fetal compromise at an early enough stage to allow intervention (10).

- British guidelines published in 2001(11) do not recommend admission CTG in low-risk woman, while Swedish guidelines published in the same year recommend the test in all women

Gynaecologic OPD from June 2016 to June 2018 were included in the study. The data was collected based on the medical records of the patients. As it was a retrospective study, ethical clearance was exempted as per hospital policy. There were a total of 15 cases of primary amenorrhoea registered over a period of two years (June 2016 to June 2018).

Materials and Methods:

This study was conducted during the period of 6 months from 1st January 2018 to 30th June 2018. It was a prospective, single centre observational study at the labour room Department of Obstetrics and Gynaecology.

Inclusion Criteria:

Women were eligible to join the study were

1) Who had >= 36 weeks of gestation
2) In the first stage of labour (spontaneous onset of labour) with single fetus.
3) High-risk obstetric cases such as: pregnancy with medical disorder (e.g. diabetes, hypertension, renal disease etc.), previous history of stillbirth, Pregnancy Induced Hypertension (PIH)/pre-eclampsia, post-dated pregnancy, Premature Rupture Of Membranes (PROM), Oligo/Polyhydramnios, IntraUterine Growth Restriction (IUGR), Rh-ve pregnancy .

Exclusion Criteria

Women <36 weeks gestational age

Intrauterine fetal demise

Congenital malformations

Multiple gestations

Admission Test Procedure And Monitoring

On admission, the women's details and history including age, parity, antenatal care, and menstrual, obstetric and medical history were documented. General physical examination was done. Per abdominal and bimanual examination were performed to determine the stage of labour, following which patients were subjected to CTG test. A tracing was taken for 20 minutes with the patient in a semi-lateral position in a labour room. The FHR traces obtained were categorized as reactive, equivocal or ominous as according to the classification proposed by NICE (National Institute of Clinical Excellence – Clinical guideline September 2007) (12).

Following the AT, patients with reactive trace were monitored intermittently by auscultation for one minute every 30 minute in the first stage of labor and every five minutes in the second stage of labor

post contraction. Cases with equivocal trace were put on continuous CTG monitoring. In those with ominous tracings, appearance of late, significant variable or prolonged decelerations, delivery was hastened by operative or instrumental intervention depending upon stage of labor. After delivery, the color of liquor, and Apgar score was determined.

Foetal And Neonatal Outcome

Fetus/neonate was considered to be in distress if one of the following were present.

1. Ominous FHR changes led to Caesarean section (LSCS) or forceps/ventouse delivery.
2. Presence of moderate – thick Meconium Stained Liqor (MSL).
3. Apgar score at 5 minute <7.
4. Admission into neonatal intensive care unit (NICU) for birth asphyxia.
5. Intrapartum/Neonatal mortality

Results:

About sixty women were recruited. Primigravida were about 24 (40%) and multigravida were 36 (60%) (Table 1). Many women are between 26 to 30years and 56 (93%) of total women were between 37 weeks to 40 weeks.

AGE(years)	REACTIVE N(%)	EQUIVOCAL N(%)	OMNIOUS N(%)	TOTAL (N=60)
17-20	12 (92.31%)	1 (7.69%)	0	13
21-25	11 (73.33%)	3 (20%)	1 (6.66%)	15
26-30	13 (76.47%)	4 (23.52%)	0	17
31-35	4 (44.44%)	3 (33.33%)	2 (22.22%)	9
36-40	3 (50%)	2 (33.33%)	1 (16.66%)	6
PARITY				
PRIMI	14 (58.33%)	8 (33.33%)	2 (8.33%)	24
MULTI	23 (63.88%)	12 (33.33%)	1 (2.77%)	36
GESTATIONAL AGE				
37-40 weeks	38 (67.85%)	12 (21.42%)	6 (10.71%)	56
>40 weeks	2 (50%)	1 (25%)	1 (25%)	4

Table 1: Age, parity, gestational age wise comparison of CTG interpretation. Data is expressed as number (N) and %.

About 5% are with PIH and 3.3% were with IUGR and 3.3% were with PROM, 3.3% with diabetes, 8.3% with oligohydramnios and 8.3% with Rh–ve pregnancy (Table 2).

RISK FACTORS	NUMBER	%
POSTDATED	0	0
PIH	3	5
PIH with IUGR	1	1.6
IUGR	2	3.3
PROM	2	3.3
OLIGOHYDROMNIOS	5	8.3
DIABETES	2	3.3
RH -VE PREGNENCY	5	8.3

Table 2: Risk factors in the study population

Seventy 71.66% of admission cardiotocography were reactive of which 2 (4.65%) of the babies were associated with fetal distress. Of the 13 women who had an equivocal trace 2(15.38%) had fetal distress, whereas 3(75%) out of 4

women who had ominous test had fetal distress. Incidence of fetal distress significantly increased with worsening of CTG tracing.

Results	AT result		Fetal Distress	
	Number	%	Number	%
Reactive	43	71.66	2	4.65
Equivocal	13	21.66	2	15.38
Ominous	4	6.66	3	75

Table 3: Admission Test (AT) result:

Incidence of birth asphyxia was greater in the non-reactive test group when babies were assessed by APGAR score<7 at 5 minute, there was one neonatal death due to birth asphyxia in baby born to a mother with ominous CTG tracing

Moderate-thick MSL	1
Apgar score at 5mins<7	3
NICU admissions	7
Neonatal death	1

Table 4: Correlation of Fetal/Neonatal outcomes with AT:

Vaginal deliveries were more common when the test was reactive in compared to operative delivery. On the other hand operative deliveries were more common when the CTG was non-reactive compared to reactive group. An important observation was that those who underwent operational or instrumental delivery in the reactive group fetal distress was the indication, among the remaining the most common reason for operative/instrumental delivery was non progress of labour and fetal distress.

MODE OF DELIVERY	REACTIVE (n=43)	EQUIVOCAL (n=13)	OMNIOUS (n=4)
Spontaneous vaginal delivery	23	12	3
Forceps delivery	0	1	0
Caesarean delivery	1	16	4

Table 5: Mode of the delivery with the results of admission test.

Discussion:

Use of Electronic FHR Monitoring (EFM) at the time of admission in labour has been employed by some centers to identify foetuses that are at an increased risk of hypoxia. 2 EFM can detect hypoxia early and avoid unnecessary delay in intervention. It is a non-invasive recordable method of fetal monitoring and is a highly logical solution to the undeniable human factors/human lapses of manual fetal monitoring of labour. Uterine contractions serve as a functional stress to the fetus; a short tracing of FHR on admission to the labour ward may thus detect fetal intrauterine hypoxia already present on admission and also help identify those who are risk of developing hypoxia during labour (8).

The admission CTG therefore has two potential roles. It can be used as a screening test in early labour to detect compromised foetuses on admission and to select the women in need of continuous EFM during labour (13).

Use of EFM is controversial. For example Impey et al. (14) believe that neonatal outcome is not significantly improved by the use of admission CTG as compared to intermittent FHR auscultation during labour. Thacker et al(15) also feel that the use of EFM is of limited effectiveness and carries an increased risk of interventions. According to them increased information at admission will not necessarily lead to better clinical outcomes. This may be true in developed countries when the majority of the population is provided with comprehensive antenatal care, and receives personal attention during labour. Although a Cochrane review recommends that continuous EFM be limited to high-risk pregnancies (16) this may not be possible in developing countries where antenatal care is inadequate with a large number of high-risk pregnancies being delivered in crowded settings and inadequate health care provider to patient ratios.

In the present study, 4.6% of babies from mothers in the reactive AT group, 15.3% of babies from the equivocal group and 75% of babies from the ominous group showed evidence of fetal distress. Sandhu et al. (17) also reported similar rates(i.e.15% in reactive, 55% equivocal and 73% in omnious test group) of fetal distress in high risk obstetric patients in their study. Ingemarson et a(l6) observed development of fetal distress in 1.3% of the reactive group.10%of the equivocal group and in 40% of the ominous group babies.

Libiran et al(18) reported 6.55risk of fetal asphyxia in the reactive group and 50% risk in the ominous group's babies when measured by Apgar score and umbilical cord blood pH. In the present study we also observed women with reactive AT who had low risk of developing intrapartum fetal hypoxia and significantly high risk in the ominous group (75%) when assessed by Apgar score.

Interventions suggested in patients with abnormal CTG

1. Reposition the woman (22, 23) – e.g. lateral position.
2. Administration of IV fluids (21, 22).
3. Discontinuation of oxytocin or decreasing rate of infusion (21, 23).
4. Check the maternal blood pressure, pulse rate.
5. Assess abdominal tone to exclude a tonic uterus (19, 20).

6. Perform a Vaginal Examination to exclude cord prolapse (22).
7. Prepare for assisted delivery or emergency caesarean section if abnormal CTG persist in spite of conservative measures.

Conclusion:

The admission CTG is a simple non-invasive test that can serve as a screening tool in high-risk obstetric patients to detect fetal distress already present or likely to develop and prevent unnecessary delay in intervention. As the test has high specificity, it has a role in obstetric wards of non-industrialized countries with a heavy workload with a large number of high-risk cases and limited resources to help in 'triaging' fetuses. CTG is useful as an early triage for categorization of mothers based on tracings obtained and early intervention to be made for better outcomes.

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