

Role and Effectiveness of Normal and Abnormal Admission Cardiotocography (CTG) and its Association with Perinatal Outcomes

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Abstract

Background: Cardiotocography (CTG) is worldwide the method for fetal surveillance during labour. Although it is applied on a large scale, this technique is still subject to debate. Cardiotocography provides direct information of fetal condition in contrast to other technique. The aim of the study is to identify the intrapartum fetal heart rate patterns associated with increased risk of neonatal depression using cardiotocography (CTG).

Methods: This prospective observational study conducted in the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar for the period of 1 year (June 2021 to May 2022). Total 250 pregnant women were studied in this period. Statistical analysis of significant cases $p < 0.05$.

Result: According to inclusion criteria Total 250 cases divided into two groups i.e. normal and abnormal CTG. In Abnormal CTG group takes both suspicious and pathological cases. The difference in Apgar score, NICU admission and perinatal asphyxia was statistically significant ($p < 0.05$).

Conclusion: Cardiotocography can be continued as good screening test of fetal surveillance. Abnormal & TG in fluence the fetal outcomes, i.e., poor Apgar score at 1 minute and 5 minutes, increased rate of caesarean section and neonatal resuscitation.

Keywords: Cardiography, fetal distress, perinatal outcome, high risk pregnancy.

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Background

Cardiotocography (CTG) is a complex technology applied for surveillance of the fetus during pregnancy, labour and delivery [1]. The fetal heart rate and the frequency of the uterine contractions can be continuously monitored. There are two methods of monitoring the fetal heart rate: the external method, in which an

ultrasound transducer is placed on the mother's abdomen by an elastic belt, and the internal method, in which electrocardiographic leads are attached directly to the fetus after rupture of the membranes [2]. The uterine activity is monitored by an external tocotransducer or by an intra-uterine catheter; the

transducers or electrodes are connected to a cardiotocograph where the fetal heart rate and the frequency and duration of the contractions are displayed. Both are recorded in a continuous tracing on paper [3]. The labour admission test is a CTG of 20-30 minutes' duration, carried out when the woman is admitted to the labour ward. The test is a part of the labour admission assessment, which, among other things, includes assessing the size, position and presentation of the fetus, the frequency and strength of the contractions and how the woman is coping with the contractions.

The test was introduced as a risk screening in early labour, to detect the compromised fetus on admission and to select the women in need of continuous electronic fetal monitoring during labour [4,5]. The test is commonly used for screening in many countries [6,7] and was introduced at a time when scientific knowledge about the test was scant, but trust in the benefits of electronic fetal monitoring was great.

Materials and Methods

This prospective observational study was done at Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar

Results

from June 2021 to May 2022. In this one year period admitted patients detailed history was taken including all the demographic characteristics. detailed history was taken including all the demographic characteristics. Informed consent was taken after explaining the procedure in detail.

The inclusion criteria were pregnancy at 37-42 weeks of gestation in labour (latent /active) with abnormal cardiotocography. The exclusion criteria were known fetal congenital malformation, malpresentations multiple gestation, ruptured membrane more than 24 hours, intrauterine growth restriction, patients with medical disorders like (HTN & diabetes), decrease fetal movement and bad obstetric history.

Total 250 patients were included by purposive sampling. A prospective observational study was done. Patients were divided into 2 groups, normal and abnormal (pathological and suspicious).

Data Analysis

Statistical processing of data was done by SPSS, version 21.0. Variables will be listed as frequencies and percentage. For statistical analysis, p value <0.05 was taken as level of significance.

Table 1: Demographic data of normal and abnormal groups

	Normal CTG	Abnormal CTG	P value
Age:			
<18years	10(21%)	37(78.9%)	<0.05
18-35years	90(51.3%)	86(48.7%)	NS*
>35years	15(55.6%)	12(44.4%)	NS*
Pregnancy status:			
Primipara	26(34%)	51(66%)	<0.001
Multipara	88(50.6%)	85(49.4%)	NS*
Gestational age:			
Pre term (28-<37weeks)	26(56.5%)	20(43.5%)	NS*
Term (37-42 weeks)	80(54.6%)	66(45.4%)	NS*
Post term (>42 weeks)	11(18.3%)	47(81.7%)	<0.001

Table 2: Interpretation of CTG

CTG	Normal	Abnormal (Suspicious Pathological)
N=500	132(52.8%)	118(47.2%)

Table 3: Findings of CTG

Abnormal CTG	Frequency(n=118)	Percentage
Bradycardia	25	21%
Tachycardia	30	26%
Early deceleration	14	11%
Late deceleration	37	31%
Variable deceleration	9	8%
Silent	3	2.5%

Table 4: Mode of deliveries

Mode of delivery	Normal CTG	Abnormal CTG	Total	P value
SVD (Spontaneous vaginal delivery)	152(77%)	45(23%)	197(79%)	<0.001
Instrumental vaginal birth (Forceps)	0(0%)	2(100%)	2(0.6%)	<0.001
LSCS (Emergency)	11(22%)	40(78%)	51(21%)	<0.05

Table 5: Association of CTG findings with perinatal outcomes

Perinatal outcome	CTG (Normal)	CTG (Abnormal)	Total	P value
Low APGAR score at 1 st & 5 th minute	25(30.4%)	56(69.6%)	81	<0.05
NICU admission	14(16.67%)	73(83.33%)	87	<0.001
Perinatal asphyxia	11(22.8%)	35(77.17%)	46	<0.05
Meconium aspiration	9(23.17%)	32(76.82%)	41	<0.05
Neonatal seizure	2(30%)	14(90%)	16	<0.001
Low birth weight	40(51.6%)	38(48.39%)	78	NS*

*NS: Not significant

Discussion

Intrapartum fetal heart rate abnormalities occurring in presence of uterine contractions can be the reflection of placental circulation and fetal tissue perfusion. Intrapartum fetal surveillance can be done by various methods. Electronic fetal monitoring using cardiotocography (CTG) is a simple option available. The CTG trace was described according to NICHD 2008 classification.

For identification of intrapartum asphyxia, sensitivity of this EFM was found to be 93% and positive predictive value was just 3- 18% [8]. CTG is a commonly used test for antepartum and intrapartum fetal surveillance, although its clinical impact on fetal outcome is controversial. But it's rational to use, because it gives a picture of fetal outcome which reflects fetal cerebral-cardiac response and fetal hypoxia.

Neonatal asphyxia is 3.9 times higher in abnormal CTG and intrapartum fetal distress [9].

In our study, <18 years, 21% had normal CTG and 78.9% had abnormal, which was statistically significant. 24% of elderly group, more than 35 years had abnormal CTG. 51.3% had normal CTG within 18-35 years of age. 66% nulliparous patients had significant numbers of non-reassuring CTG. 81.7% in post term patients had abnormal CTG.

Jing Lu *et al.*, found in their study that 33% were in adolescent group and 32% were in 23-42 years. Among nulliparous patients, 49.1% patients had normal CTG and 84.1% had abnormal ($p < 0.05$). In post term pregnancies they found significantly raised non-reassuring CTG [10].

In our study, 47.2% patients had suspicious and pathological CTG. Among these, 21% had bradycardia, 26% had tachycardia, 11% had early decelerations, 31% had late decelerations 8% had variable decelerations and 2.5% had silent CTG.

In our study, 77% patients with normal CTG and 23% had abnormal CTG delivered baby vaginally spontaneously. 3 patients with abnormal CTG needed low forceps delivery. 78% with abnormal CTG ended in emergency caesarean section.

Khursheed *et al.*, shows in their study that, patients with normal CTG delivered vaginally are 62.50% and via caesarean section are 37.5%, while with abnormal CTG delivered vaginally are 27.27% and by caesarean section are 72.72% [11].

In our study 69.6% low Apgar score babies were delivered from Mothers with abnormal CTG. With pathological and suspicious CTG, 83.33% babies needed NICU admission, 77.71% had perinatal asphyxia, 76.82% had meconium aspiration, neonatal seizure was present in 27 t.

Significant low birth weight and Low Apgar score was present in the study of Jing Lu *et al.*, [10]e Morokuma *et al.*, found that small for gestational age in non-reassuring CTG were significant [12].

Conclusion

Labour can be the state of progressive acidemia and fetus encounter physiological stress which can become pathological if intrapartum surveillance and timely delivery is not done. We studied that correlation between CTG category and requirement of extensive resuscitation and neonatal depression at birth. Cardiotocography is one of the reliable methods of monitoring of fetus in pregnancy and during childbirth. Pathological CTG record with high probability indicates possibility of existence of perinatal asphyxia. Unfortunately, cardiotocography has also large number of false positive findings. Its sensitivity is 66%. Therefore, records from pregnancy, suspicion of fetal hypoxia / asphyxia should be confirmed by ultrasound Doppler examination; in birth suspicious (positive ones) records should be checked by pH monitoring.

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