PREDICTIVE VALUE OF CTG IN POST-DATED PREGNANCY

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ABSTRACT

AIM

This study evaluates the usefulness of intrapartum cardiotocography in patients with post-dated pregnancy compared to intermittent auscultation.

MATERIALS AND METHODS

100 patients with pregnancies beyond EDD and with no other risk factors were included in the study; 50 patients who underwent CTG on admission into labour ward formed the study group and 50 patients who underwent intermittent auscultation formed the control group. Antenatal foetal monitoring namely daily foetal movement count, twice-weekly non-stress test with amniotic fluid assessment and Doppler velocimetry using ultrasound were done in all patients until the onset of labour. Labour was induced whenever NST was non-reassuring or ultrasound showed oligohydramnios. Partogram was used to monitor the course of labour.

RESULTS

The foetal outcome was better in the study group than in the control group with fewer depressed babies. Cardiotocography had a positive predictive value of 36 36% and a negative predictive value of 94.04% with a P value of 0.010.

CONCLUSION

Cardiotocography is definitely superior to intermittent auscultation in intrapartum foetal monitoring. Despite the high number of false positives, CTG predicts the outcome of labour in every patient and especially in cases with prolonged pregnancy it serves as a valuable screening tool to pick up those cases that may be compromised by the events of labour.

KEYWORDS

Cardiotocography (CTG), Non-Stress Test (NST), Prolonged Pregnancy, Foetal Heart Rate (FHR), Beats/Minute (bpm).

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INTRODUCTION

The duration of pregnancy is 40 weeks (280) days calculated from the Last Menstrual Period (LMP), according to Naegele's rule. Only 4% (1 in 20) of women deliver on the due date (EDD). Post-term pregnancy is defined as pregnancy at or beyond 41+3 weeks of gestation, i.e. 10 days after EDD. Although term pregnancy is between 37-42 weeks of gestation, there is increased maternal and foetal jeopardy after the expected date of confinement, thereby causing considerable anxiety to the mother and the treating obstetrician. Induction of labour compared to expectant management is associated with fewer perinatal deaths and caesarean sections in post-term pregnant patients.[1,2] The management of pregnancy beyond EDD relies on an accurate assessment of the gestational age, calculated from the Last Menstrual Period (LMP) assuming normal 28 days cycle (Naegele's formula). Dating gestational age with LMP alone assumes both accurate recall by the patient and ovulation on the 14th day of the menstrual cycle. Performing routine first trimester ultrasonography between 11-14 weeks of gestation to all women, i.e. dating scan is a more accurate assessment of gestational age than last menstrual period with fewer pregnancies past 40 weeks of gestation.[3] It is useful to determine Crown-Rump Length (CRL) of 45-84 mm or head circumference if CRL is greater than 84 mm in dating scan.[4]

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MATERIALS AND METHODS

This is a prospective study to assess the predictive value of cardiotocography in intrapartum foetal surveillance of post-dated pregnancy. The study was conducted in a semi-urban population of Karpagam Faculty of Medical Sciences and Research Hospital, Othakalmandapam, Coimbatore, from March 2013 to 2015.

The population consists of pregnant patients with regular menstrual cycles and dating scan done at 11-14 weeks of gestation. All high risk factors namely previous caesarean section, recurrent miscarriages, maternal age more than 35 years, twin pregnancy; medical complications namely pregnancy-induced hypertension, gestational diabetes, epilepsy, heart disease, asthma, intrauterine growth restriction and congenital anomalies complicating pregnancy were excluded from the study.

Majority of the patients were booked at Karpagam Hospital from early gestation. About 60% of patients were primigravidae, remaining were multigravidae. The age group of patients varies between 18 and 34 in both groups. It was noticed that patients who were obese at term had a higher incidence of prolonged pregnancy and caesarean section rate and early induction of labour is preferred in such patients.[5]

The study group (50) consists of those patients with pregnancies beyond EDD who underwent cardiotocography on admission into labour ward and the control group (50) consists of those patients with post-dated pregnancies who underwent intermittent auscultation on admission into labour ward. Antenatal fetal monitoring namely daily fetal movement count, biweekly non-stress testing with amniotic fluid assessment and Doppler velocimetry by ultrasound were done in all patients till the onset of labour. Methods used for cervical ripening and induction of labour were sweeping of membranes, vaginal Misoprost (PGE1) and dinoprostone gel.

Mechanical methods for cervical ripening has fewer incidences of uterine hyperstimulation and changes in foetal heart rate compared to prostaglandins.[6,7] Syntocinon and amniotomy were used for acceleration of labour. Labour was induced whenever NST was non-reassuring or amniotic fluid assessment (Single vertical pocket <2 cm) by ultrasound indicates oligohydramnios. Manning's biophysical score of measuring four quadrant amniotic fluid indices by ultrasound was no longer used as it tends to over-diagnose oligohydramnios.[8,9]

Classification of CTG-NICE guidelines - December 2014.[3]
There are 3 features in CTG

1. Baseline Heart Rate (bpm).
2. Baseline Variability (bpm).
3. Decelerations.

There are 3 CTG Patterns

1. Normal/reassuring- FHR- 100–160 bpm: variability ≥ 5: None or early decelerations.
2. Non-reassuring – FHR- 161–180 bpm: variability <5 for 30–90 minutes: variable decelerations ≤60 bpm lasting for ≤60 seconds or present >90 minutes and occurring with >50% of contractions or variable decelerations <60 bpm and >60 seconds or present for up to 30 minutes and occurring with >50% of contractions or late decelerations present for up to 30 minutes and occurring with over 50% of contractions.
3. Abnormal- FHR >180 or <100 bpm: variability <5 for >90 minutes: Non-reassuring variable decelerations still observed 30 minutes after starting conservative measures and occurring with over 50% of contractions or late decelerations present for over 30 minutes that does not improve with conservative measures and occurring with over 50% of contractions or bradycardia or a single prolonged deceleration lasting 3 minutes or more.

Interpretation of CTG Traces

Normal/reassuring- all 3 features are normal/reassuring.
Non-reassuring- 1 non-reassuring feature and 2 normal features and suggests need for conservative measures.
Abnormal– 1 abnormal feature or 2 non-reassuring features and indicates urgent intervention due to foetal acidosis.

RESULTS AND DISCUSSION

Age	No. of Patients	% of Patients
18-25	28	28%
25-32	63	63%
>32	9	9%

Table 1: Age Distribution

Majority of patients with history of post E.D.D pregnancy were in the age group between 25 and 32 of 63%.

Types of Cases	No. of Patients	% of Patients
Booked	80	80%
Unbooked	20	20%

Table 2: Booking Status

20% of the patients at the time of admission were unbooked.

No. of Days	No. of Cases	
	Test Patients	Control Patients
3	16	22
5	14	9
7	10	14
8	7	4
10	3	1

Table 3: Duration of Prolongation (Post E.D.D)

Pregnancy was prolonged by 3 days in 16 patients in the study group and in 22 patients in the control group.

Pregnancy was prolonged by 10 days in 3 patients in the study group and in only 1 patient in the control group.

CTG Pattern	No. of Patients	Percentage
Normal (38)	Labour Natural- 35 Caesarean section-3	92% 7%
Non-reassuring (8)	Labour Natural- 6 Caesarean section-2	75% 25%
Abnormal (4)	Labour Natural- 0 Caesarean section-4	100%

Table 4: CTG Pattern and Mode of Delivery (Study Patients)

All the 4 patients with 'Abnormal Test' pattern underwent caesarean section in order to prevent likely foetal compromise in labour.

No. of Patients	Mode of Delivery	Thick Meconium Stained Liquor	Poor Foetal Outcome (≤6 in 1 min)
Test Patients Normal Non-reassuring Abnormal	Labour Natural - Caesarean Section	2 0 1	2 0 0
Control Patients	Labour Natural Caesarean Section	4 7	4 4

Table 5: Co-relation between Meconium Stained Amniotic Fluid, CTG and Poor Fetal Outcome

In the study population, only 2 patients who had a normal test pattern and who delivered normally showed poor foetal outcome (APGAR ≤6 in 1 min), whereas in the control group a total of 8 patients showed poor foetal outcome because of meconium staining of amniotic fluid.

CTG Pattern	Mode of Delivery	Low Apgar (≤6) (in 1 min)
Normal	Labour natural =35	2
	Caesarean section=3	-
Poor Foetal Outcome = 2 (4%).		
Non-reassuring	Labour natural =6	3
	Caesarean section=2	-
Poor Foetal Outcome = 3 (6%).		
Abnormal	Labour natural =0	0
	Caesarean section=4	1
Poor Foetal Outcome = 1(2%)		
Total Poor Foetal Outcome in Test Patients- 6 (12%)		

Table 6: Co-relation between CTG Patterns, Mode of Delivery & Poor Foetal Outcome (Test Patients)

Labour Natural (28)	8
Caesarean section (22)	4
Total Poor Foetal Outcome in Control Patients-12 (24%)	

Table 7: Mode of Delivery and Poor Foetal Outcome (Control Patients)

Out of 100 patients, 50 patients who belonged to the study group underwent CTG on admission into labour ward. These patients had regular menstrual cycles and had a dating scan between 11-14 weeks of gestation. Majority of these patients were primigravidae with no risk factors. Upon reaching term, their pregnancies were closely monitored with biweekly non-stress testing and amniotic fluid assessment by ultrasound till the onset of labour. Labour was induced whenever NST was non-reassuring or amniotic fluid assessment (Single vertical pocket of <2 cm) showed oligohydramnios.

On admission into labour ward, 38 patients with a 'Normal' CTG pattern were allowed to continue in labour; 35 patients delivered normally and 4 by caesarean section. There were only 2 depressed babies of APGAR <6 in 1 minute due to meconium staining of amniotic fluid and meconium aspiration by the 2 babies. However, both the babies recovered following observation in the new-born ward for 3 days. This explains the fact that those foetuses who maintain just enough oxygenation prior to the onset of labour in prolonged pregnancy show evidence of foetal compromise. Therefore, the chance of delivering a depressed baby is 4% despite a 'Normal/reassuring CTG at the onset of labour.

Among 8 patients who had an 'Non-reassuring' CTG pattern in the study population and were allowed to continue in labour, 6 patients delivered normally and 2 by caesarean section. Since these patients were in active labour with clear amniotic fluid, there was no need for intervention. There were 3 depressed babies of APGAR <6 in 1 minute following normal delivery. These babies also recovered following observation for 3 days. Therefore, the chance of delivering a depressed baby is 6% in such cases.

Four patients whose pregnancies were prolonged for more than one week (41+weeks) had an 'Abnormal' CTG pattern on admission. The amniotic fluid was scanty and meconium stained. Labour was terminated by caesarean section in all the 4 patients within a few hours in labour. There was 1 depressed baby of APGAR <6 in 1 minute that required admission in new-born ward for 5 days. There was no perinatal mortality in this group.

Therefore, it can be concluded that when pregnancy is prolonged for more than one week following EDD, the chance of meconium staining with scanty liquor is increased, thereby increasing poor foetal outcome. Foetal Blood Sampling (FBS) may be considered in those patients with non-reassuring or abnormal CTG pattern to improve foetal outcome.[10] The incidence of cerebral palsy is increased in babies born after 42 weeks of gestation compared to those born at 40 weeks of gestation.[11]

In the control group, 50 patients with prolonged pregnancy underwent only intermittent auscultation throughout labour. Labour was accelerated with Syntocinon; 28 patients delivered normally and 22 by caesarean section. Poor foetal outcome was observed in 12 patients. The babies recovered after observation in new-born ward. There was no perinatal mortality.

CTG is associated with increased incidence of caesarean sections and instrumental vaginal births compared to intermittent auscultation.[11] Patients who are monitored with intermittent auscultation alone may be lost to follow-up resulting in increased perinatal morbidity and mortality.[12]

In the study, Admission test CTG had the following results

- Sensitivity-50%
- Specificity-84%
- Positive predictive value-36.36%
- Negative predictive value-94.04%
- P value =0.010

CONCLUSION

Patients with prolonged pregnancy can be managed wisely with proper selection of cases and cardiotocography remains the gold standard for intrapartum foetal monitoring of patients compared to intermittent auscultation. Despite the high number of false positives, CTG is a very useful screening tool for identifying those babies that are normal and those that are compromised by the events of labour. Foetal Blood Sampling (FBS) may be used in patients with a non-reassuring CTG who do not respond to conservative measures.[10] However, FBS is invasive, needs expertise, causes maternal discomfort and requires repeated procedures.[10] The ultimate aim is to reduce maternal and perinatal morbidity and mortality.

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