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Research Article

Admission cardiotocography as a screening test in high risk pregnancies and its co-relation with peri-natal outcome

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ABSTRACT

Background: Birth asphyxia which results due to deprivation of oxygen to the foetus during the birth process is still the leading cause of perinatal death. So the labour should be monitored by an effective method. Electronic foetal monitoring is quite promising in this regard. The present study was done to project the effectiveness of cardiotocography (CTG) at admission to labour room in high risk pregnancies as a predictor of perinatal outcome.
Methods: This is a randomized prospective study conducted in the labour room of SCB Medical College, over a period of 1 year (April 2013 to April 2014) at Cuttack, Odisha, India. All women randomized for the study were subjected to initial admission CTG in the 1st stage of labour. Those with a normal/reassuring admission test, monitored by intermittent auscultation method and those with abnormal test were monitored by continuous CTG. Foetal and perinatal outcome were co-related with admission CTG.
Results: Foetal distress during labour developed in 29 % of patients with a normal test and in 64% of patients with an abnormal test. The admission test had a sensitivity of 44% specificity 95% of and a positive predictive value of 50% for predicting an APGAR score 5 min after birth. Neonatal admission to SNCU was required in 29% of patients with a normal test and 45% of patients with an abnormal test.
Conclusions: Labour admission CTG should be used for screening but not a sole diagnostic test of compromised foetus. It is found to be valuable in high risk pregnancy.

Keywords: Admission cardiotocography, High risk pregnancy, Perinatal outcome

INTRODUCTION

The intra-partum stress is well tolerated by a normal foetus but a compromised foetus can't sustain this so the potential risk of intra-partum hypoxia and subsequent hypoxic ischemic encephalopathy is common in high risk pregnancies and they need proper intra-partum monitoring. Birth asphyxia accounts for 4-9 million cases globally, out of which 1.2 million dies every year. Birth asphyxia accounts for 23% of all neonatal deaths. Intra-partum events are responsible for 8-15% of cerebral palsy, 20% of stillbirth and 10% of severe mental retardation. So labour should be monitored by an ideal method which should be non-invasive, reliable, readily available, easily interpretable, and should identify labour abnormalities. Admission cardiotocography (CTG) comprises a CTG of 20-30 minutes done at admission to Labour room. This test can identify foetus which are compromised in the early labour and needs a continuous foetal monitoring. Most RCTs were of opinion that the admission test led to more intervention with no additional benefits to newborn in low risk pregnancy.[1] In 1989 ACOG recommended that intermittent auscultation is equivalent to continuous electronic foetal monitoring in detecting intra-partum foetal compromise. Neilson opined that electronic foetal monitoring should be used in complicated labour.[2]

In case of high risk pregnancy admission CTG has some value and more number of RCTs and other observational

studies are required to support this view. British guidelines published in 2001 do not recommend admission CTG in low-risk women, while Swedish guidelines in 2001 recommend the test in all women.[3,4] The aim of our study is to predict correlation between admission CTG and perinatal outcome.

METHODS

Table 1: High risk pregnancy.

History of recurrent pregnancy losses
Previous history of stillbirth
Pregnancy with concurrent medical illness like
• Hypertension
• Diabetes mellitus
• SLE
• Thrombophilias
• Antiphospholipid syndrome
• Renal disease
• Hepatic disease
Anaemia
Preeclampsia
Premature rupture of membranes > 6 hours
Intrauterine growth restriction
Oligohydramnios
Rh-alloimmunization
Postdatism
Diminished foetal movements

This is a randomised prospective study conducted in the labour room of SCB Medical College a 1208 bedded tertiary hospital over a period of 1 year (April 2013 to April 2014) at Cuttack, Odisha, India. 200 patients who were admitted in the labour room in the 1st stage of labour with singleton pregnancy were categorised as high risk cases (Table 1).

They were subjected to admission CTG for 20 minutes. The results of the test were categorized as normal/reactive, equivocal/suspicious, and abnormal/non-reactive as per NICE guidelines (Table 2) for the interpretation of CTG tracings.[5]

Table 2: Definition of CTG tracings.

Category	Definition
Normal	An FHR trace in which all four features are classified as reassuring
Suspicious	An FHR trace with one feature classified as non-reassuring and the remaining features classified as reassuring
Pathological	An FHR trace with two or more features classified as non-reassuring or one or more classified as abnormal

Table 3: CTG tracings.

Category	No. of patients
Reactive	164(82%)
Equivocal	14(7%)
Non-reactive	22(11%)

Table 4: Mode of delivery.

	VD	Instrumental	LSCS	Total
Reactive	74 (45%)	12(7%)	78 (47.5%)	164
Equivocal	8 (57%)	4(28.5%)	2 (14%)	14
Non-reactive	2 (9%)	2(9%)	18 (81%)	22
	84	18	98	200

Table 5: Foetal distress.

	Meconium Staining	
	Yes	No
Reactive	48(29%)	116
Equivocal	4(28.5%)	10
Non-reactive	14(64%)	8

Inclusion criteria

Women admitted in the 1st stage of labour with singleton pregnancy and a gestational age more than 196 days with high risk factors as mentioned in the table.

Patients with a normal/reactive test were monitored by intermittent auscultation for 1 minute, every 30 minutes in the first stage of labour and every 5 minutes in the second stage of labour. Those with abnormal tracings were placed on continuous CTG monitoring. Those with non-reassuring foetal heart rate, appearance of late or variable decelerations were considered non-reactive. In these patients delivery was hastened by operative or instrumental intervention depending on the stage of labour. The mode of delivery was documented in all these patients. Peri-natal outcome was assessed in terms of meconium staining, APGAR score, and SNCU admissions and rate of neonatal mortality.

RESULTS

Results of the study are depicted in tabulated form. Out of the 200 cases 164 had reactive admission test, 14 had equivocal and 22 had abnormal tracings (Table 3). In the reactive test group 47.5% underwent LSCS as compared to 81% in abnormal test group (Table 4). Foetal distress occurred in 64% of cases in abnormal test (Table 5). APGAR score at 5 min after birth <7 in 50% of abnormal test (Table 7). Admission to SNCU was 45 % in abnormal group (Table 6). Whatsoever measures we took, even then there were 6 stillbirths and 4 neonatal deaths in abnormal test group.

Table 6: Perinatal outcome.

		SNCU admission		Total admission			
	Good	>24 hr	<24 hr		SB	ND	Total
Reactive	114	20	28	48 (29%)	2	2	164
Equivocal	8	2	4	6	0	2	14
Non-reactive	6	4	6	10 (45%)	6	4	22

SB-stillbirth, ND-neonatal death,

Table 7: APGAR score

	1st min APGAR			5th min APGAR		
	<7	>7	Total	<7	>7	Total
Reactive	48	114	162	10(6%)	152	162
Equivocal	4	10	14	4	10	14
Non-reactive	14	2	16	8(50%)	8	16

DISCUSSION

Amongst the different modalities of intra-partum foetal monitoring, CTG is most reliable and informative which is non-invasive also. Admission CTG is a 20 min continuous recording of foetal heart rate immediately after admission to the labour room which segregates the high risk women into normal and abnormal group, where the abnormal group is more vulnerable to adverse foetal outcome. Previous RCTs and various studies have shown that there is an increase rate of LSCS and instrumental delivery in the abnormal CTG women.

Although a Cochrane review recommends that continuous EFM be limited to high-risk pregnancies, 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.[6]

Gourounti et al, have done a meta-analysis of different RCTs where admission CTG was done in low risk patients and they have found that in CTG group there was increase rate of caesarean section and instrumental delivery and no neonatal benefit in terms of birth asphyxia and admission to SNCU was found.[7]

In our study foetal distress was found in 64% of non-reactive cases and 29% of reactive cases as compared to Ingemarsson et al, done in low risk patients where they had foetal distress in 40% of non-reactive group and 1.4% in reactive group.[8] Das V et al, included both high risk and low risk cases in their study and found that foetal distress was 31.5 % in high risk and 18.8% in low risk of reactive category, whereas it was 54% in high risk and 1.1% in low risk in non-reactive category.[9] Sandhu et al, have done admission CTG in high risk patients where they found that foetal distress occurred in 15% of reactive group and 73% in non-reactive group.[10] High incidence of foetal distress in our study may be due to inclusion of only high risk cases which correspond with the study by Sandhu et al. In present study positive predictive value is 63% for foetal distress with low sensitivity and high specificity as compared to study of Sandhu et al whose PPV is 73%.

Table 8: Comparison of various outcomes.

	Sensitivity	Specificity	Positive predictive value
Foetal distress	22.5 %	93.5%	63.6%
1 min APGAR score	22.5%	98.2%	87.5%
5 min APGAR score	44.4%	95%	50%
SNCU admission	17.24%	95%	62.5%

In the study of Das V, 45.7% underwent LSCS in reactive category and 47.8% in non-reactive category whereas in our study 47.5% underwent LSCS in reactive and 81% in non-reactive category. Mires et al 2001 and Impey et al, reported that there is increased incidence of LSCS and

instrumental delivery in CTG group but the difference was not statistically significant.[11,12]

The sensitivity, specificity, positive predictive value for 5 min APGAR score <7 in our study was 44.4%, 95%, 50% respectively (Table 8) which are corresponding with the study of Sandhu et al study (APGAR score <5). Also admission test has high specificity and low sensitivity in predicting outcomes in high risk cases which is consistent with the study of Rahman et al (specificity 95%) who have also assessed in high risk cases.[13]

With regard to SNCU admission the positive predictive value in present study is 63% as compared to 33% in study by Sandhu et al. This adverse event was rare in their study in both normal as well as abnormal category so the PPV is less whereas our institution is a referral centre where the number of late referral cases are more resulting in high SNCU admissions. In our study in spite of continuous foetal monitoring there were 4 neonatal deaths in reactive and 10 in non-reactive group.

CONCLUSION

CTG is a non-invasive test to detect the current status of the foetus which is sensitive for detection of adverse foetal outcome. The only disadvantage is that the patient as well as the treating obstetrician may have a false sense of relief where admission CTG is reactive, but the status may change during the process of labour. In case of high risk pregnancies with heavy patient burden and low resource setting, admission CTG is a sensitive and specific test in predicting peri-natal outcome. However more number of systematic studies and RCTs are required to prove or disprove the fact.

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