

Reactive Cardiotocography Vs Non Reactive Cardiotocography and Fetal Blood Sampling in Intrapartum Monitoring

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ABSTRACT

Background: Assessing status of the fetus during labor pains is a difficult task. And acceptable fetal monitoring during labor usually comprises of Cardiotocography to record fetal heart rate. It shows fetal brain response to acidic blood pH, changes of blood volume and decreased oxygen level, as fetal heart function is under brain's control.

Aim: To compare Cesarean section frequency with Cardiotocography (CTG) versus Fetal blood sampling and Cardiotocography.

Methods: This cross sectional analytical analysis was conducted at Lady Willingdon Hospital, Lahore from October 2017 to April 2018. Hundred patients in labor, who fulfilled the criteria were included. They were placed at random into two groups i.e. Group A (continuous Cardiotocography) and Group B (continuous Cardiotocography and fetal blood sampling). The patients in first group were selected for Cesarean Section. In Group B hypoxia was assessed. Data analysis carried out by using SPSS version 21. All relevant parameters were calculated.

Results: The mean age of patients was 27.64±4.38. The mean duration of pregnancy was 39.3±1.05 weeks. In group an all patients underwent Cesarean Section whereas in group B, 60% of the patients had LSCS and rest had vaginal delivery. In group A, 56% had Apgar score < 7 at 5 minutes, whereas in group B, 36% had score < 7 at 5 minutes.

Conclusion: Cardiotocography (CTG) when used along with Fetal Blood Sampling for fetal blood pH is an effective way for assessing fetal condition in labor to decide the mode of delivery.

Keywords: Cesarean Section, Fetal blood Sampling, Non-Reactive CTG.

INTRODUCTION

Graphic record of fetal heart during Labor is considered to be as good monitoring test. It is used widely in the developed countries during pregnancy and labor. This technology came into being in 1950 and its use was started in 1960 and was actually used by midwives and Obstetricians as screening tool to predict low oxygen in fetal blood¹.

Normal tracings usually show that the fetus is adequately oxygenated². In 50% of the cases the results are not satisfactory³.

CTG shows high sensitivity but less specificity. It means that normal trace identifies a fetus with low Oxygen levels but abnormal trace doesn't show that the fetus is getting less Oxygen⁴. The CTG has less ability to indicate poor outcome⁵. CTG has gained controversy as it is unable to predict cerebral palsy and control rising rate of Cesarean Section. One of the requirements is to find correlation between asphyxia and cerebral palsy on early blood samples. Intervention is mandated when pH is more than 7 and base deficit is more than 12mmol/l⁶.

There is consensus of opinion that CTG needs coupling with another modality to bring about improvement⁷. Fetal Blood Sampling may be of help in reducing rising C Section rate associated with non-reactive CTG. FBS can be done for pH evaluation in association to

non-reactive CTG and can be productive⁸.

Fetal Blood Sampling was introduced by Saling in 1960 as an indicator of low Oxygen levels in fetus⁹. Biochemical evaluation of fetal blood pH, is labelled as a "gold standard". The measurement of pH is carried out on fetal scalp or umbilical blood¹⁰.

Usually decrease in pH means that low Oxygen level are present in blood of fetus and not tolerating labor in a good manner. The evaluation of fetal pH needs 30-50 microliters of sample and 20% failure rate has been observed^{7,11}.

Holzmann et al did a study on a large number of subjects and carried out pH and lactate analyses by fetal blood sampling. They concluded that Fetal Blood sampling is an early indicator of low levels of Oxygen in fetal blood during labor and its value cannot be undermined¹².

In another local study done at Liaquat Medical University, CTG was used for monitoring of patients admitted in labor. From this study it was inferred that CTG has to be coupled with other methods to improve credibility¹³.

CTG results in increased Cesarean section rate but is more useful in medico legal litigation as compared to Fetal Blood Sampling¹⁴.

Rationale is to decrease escalating C- Section rate due to non-reactive fetal heart rate. It is not of much help for detecting low fetal oxygen levels and needs to be coupled with additional test such as FBS to increase the credibility of its results.

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PATIENTS AND METHODS

It was a cross sectional analytical study carried out in Gynecology department, Lady Willingdon Hospital, Lahore from for a period of one year. Non-probability, purposive sampling was used .All booked laboring patients patients with single normal fetus with vertex presentation , with pregnancy of 37-42 weeks as calculated by LMP with cervical dilatation more than 3cm were included in the study.

Those with evidence of compromised fetus on external cardiac monitoring, those close to delivery, having bleeding during pregnancy and fetal growth retardation on scan, severe low hemoglobin levels (Hb <7g/dl), proteinuric hypertension and diabetes, previous sections and infections were not included in the study.

Approval from local ethical committee was taken and 100 booked patients admitted in Lady Willingdon Hospital, Lahore were included in the study. Informed, written consent was taken. In the Group A, 50 patients having non-reactive CTG were taken and underwent C section. While in Group B patients, in 50 patients having non-reactive CTG, fetus was assessed by continuous Cardiotocography as well as fetal scalp sampling. Fetal blood samples were assessed for pH value and further planning was done.

In case of normal pH =>7.2, sampling was done after an hour if fetal heart rate abnormality was there as before or earlier if required. If the second sample was indicative of normality, patient was allowed to go for vaginal delivery. If the pH was was borderline (7.21-7.24) sampling was planned after 30 minutes of supportive measures. If no betterment was observed, cesarean delivery was done. If the pH was < 7.2, emergency cesarean section was done. At the same time other factors in mother and fetus amniotic fluid color, fetal heart rate and maternal pyrexia were noted. If FBS was not possible emergent C section was performed in 30 minutes. Once delivered Apgar score was noted.

The patient was placed in lithotomy or left lateral position. Asepsis was created, Bishop Score was assessed. The amnioscope was used to see the fetal scalp which was cleaned with dry cotton and was sprayed to achieve capillary action. Light source was used with FBS device and small cut was given. Two samples were collected in the syringe containing heparin and was analyzed rapidly for pH and base excess, at laboratory of Lady Willingdon Hospital, Lahore.

The data was recorded on a predesigned proforma. It was analyzed using SPSS version 21.0. Quantitative variables like age, gestational age and scalp blood pH, Apgar score at 1 min and 5 min were presented as mean and standard deviation. Qualitative variables like gravidity and Apgar score were calculated as Frequency and percentage. Both groups were compared by chi-square for any difference and p-value ≤0.05 was considered as statistically significant.

RESULTS

One hundred patients were included in the study. Mean age was noted as shown in Table 1. Mean gestational age was noted as in Table 2. In this study, Parity distribution

can be seen in Fig. 1. In Table 3 cardiotocography status of both the groups can be seen (Table 3).

In group B, at first attempt of fetal scalp blood sampling, 14 cases had normal pH (7.25-7.35), 34 cases had borderline pH (7.21-7.24) and 2 cases had abnormal pH (=<7.20). The figures for the final attempt are shown in Fig. 2. There was significant difference between the sub-groups (P<0.0001).

Mode of delivery in both groups can be seen in Table 4. In group B, cases with abnormal pH sampling, all underwent LSCS, while all cases with borderline pH sampling had LSCS. And in cases with normal pH sampling all were delivered vaginally (SVD). There was significant difference observed among sub-groups.

Fig. 1: Distribution about gravidity of the patients

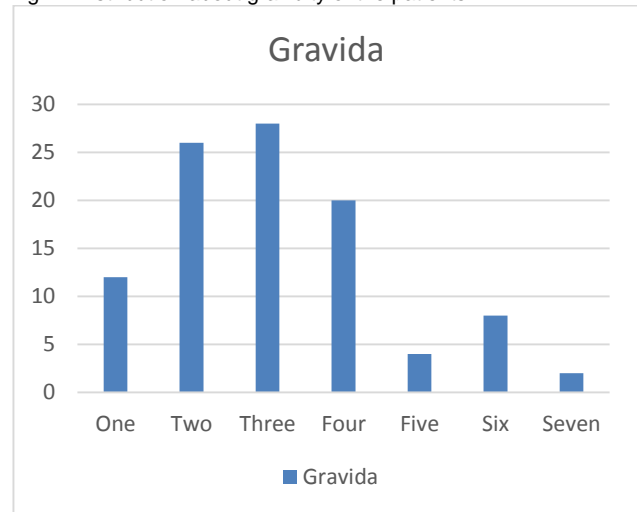


Fig. 2: Group –B, Distribution of pH Sampling Results

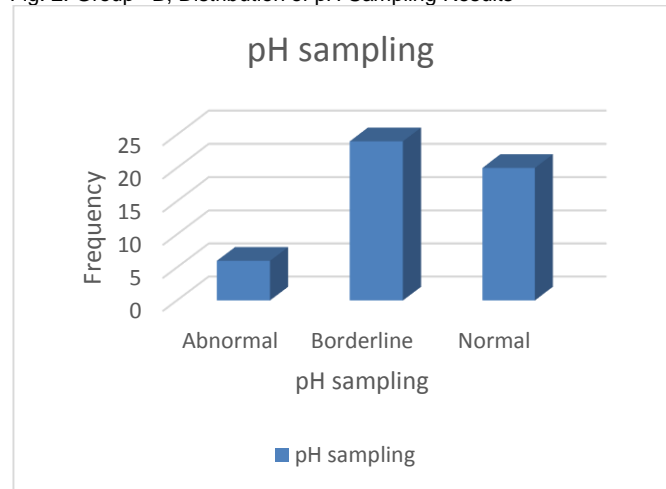


Table 1: Age – descriptive statistics

Age (years)	n
N	100
Mean	27.64
SD	±4.38
Minimum	19.00
Maximum	37.00

Table 2: Gestational age (weeks): Descriptive status

Gestational age (weeks)	n
Mean	27.64
SD	±4.38
Minimum	19.00
Maximum	37.00

Table 3: Reactive and non-reactive CTG in group A

CTG	n
Non -Reactive	26(26%)
Reactive	12(12%)
Total	50(100%)

Table 4: Mode of delivery in both study groups

Mode of delivery	Group A	Group B
SVD	0(0%)	20(40%)
LSCS	50(100%)	30(60%)
Total	50(100%)	30(60%)

P value=0.0001, Chi-square = 25.000

P-value = 0.0001 (Significant)

DISCUSSION

CTG is a continuous recording of the fetal cardiac activity done by transducer placed on maternal abdomen. Monitoring during labor is done to ensure fetal wellbeing and the only reason to intervene is to improve long and short term perinatal outcome.¹⁵ Continuous electronic fetal monitoring in women, who are not high risk results in increased risk of intervention without any improvement in outcome. In low risk pregnancies intermittent auscultation can be done to improve outcome¹⁶. The fear of unnecessary interventions with CTG is used has called for other investigations and Fetal Blood Sampling is one of them.⁶ In 1963 Saling and Brestcher introduced fetal scalp analysis. It is a tool to detect fetal acidosis and fetal compromise during labor¹⁰.

In a study done by Ayromlooi J, Garfunkel R, the use of FSB pH sampling has been shown to reduce the rate of cesarean section from 78.0% to 57.5% without a prominent change in the Apgar score¹⁷. This study agreed with the findings of our study. And In a study done by Reif and colleagues, it was observed that operative delivery could be reduced in 6.4% of the study population, in spite of the non-reassuring fetal heart rate trace, proving that fetal blood analysis is an effective modality to cut down the rate of operative deliveries¹⁸.

Holzmann M et al did a secondary analysis on a large population, who underwent pH analyses by FBS. Severe acidemia during labor was present in 6.8% of cases with pH analyses and this finding was closer to our results¹².

Kavitha et al in their study concluded that additional methods are required to improve the value of fetal monitoring to curtail unnecessary intervention¹⁹.

In another local study, CTG was used for monitoring patients admitted in labor. About 27% of the patients with non-reactive CTG delivered normally, while no such case took place in our study. The association of non-reactive CTG with low Apgar score and abnormal fetal scalp pH was seen in this study which matched our results. From this study it was inferred that CTG needs to be combined with other methods and the results from this study strengthened our claim that both methods of fetal monitoring when used together are more effective¹³.

A study was done in 2012 to evaluate the role of cardiotocogram (CTG) done at admission in detecting fetal hypoxia during labor and to observe admission CTG results with fetal outcome in patients having risk factors. It was observed that in patients with non-reassuring CTG, adverse perinatal consequences were more. This result is also closer to our findings²⁰.

Almost all the contemporary studies on the subject potentiate our findings and highlight the need for another method for fetal monitoring during labor which can be used in association with CTG. The strength associated with this study is the selection of a problem which is leading to high rate of C section in our set up and weakness is the small sample size of the study.

Further research is required in the subject. Fetal scalp stimulation seems to be a useful alternative to fetal blood sampling⁸. Another upcoming development in the fetal monitoring is ST wave analysis. This would also go a long way in helping recognize fetus which is at risk of hypoxia^{21,1}.

CONCLUSION

Fetal blood scalp sampling used for assessment of fetal condition during labor is precise and prediction of mode of delivery. Cardiotocography combined with fetal scalp blood sampling can help the clinicians to identify low Oxygen levels in fetus and guide intervention at appropriate time resulting in better fetal outcome.

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Conflict of Interest: We do not have any conflict of interest to declare.

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