ACTA SCIENTIFIC MEDICAL SCIENCES

Volume 2 Issue 3 June 2018

Literature Review

Correlation of Non-Reassuring Fetal Heart Rate Pattern with Cord Blood PH and its Perinatal Outcome

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Received: March 24, 2018; **Published:** May 29, 2018

Abstract

Electronic fetal monitoring (EFM) is defined as the use of electronic fetal Heart -rate monitoring for the evaluation of fetal wellbeing in labour.

1. Correlation of non-reassuring CTG using krebs scoring system with umbilical cord arterial blood pH.
2. To find out the perinatal outcome of non-reassuring CTG and abnormal cord blood pH.
3. The present study is a prospective study conducted in the department of Obstetrics and Gynaecology in Sree Balaji Medical College and Hospital, Chennai. 100 patients were included in the study from January 2016 to September 2017.

Keywords: Non-Reassuring; Fetal; Perinatal

Introduction

Electronic fetal monitoring (EFM) is defined as the use of electronic fetal Heart -rate monitoring for the evaluation of fetal well-being in labour.

Acute fetal hypoxia is one of the most serious pathological conditions in the intrapartum period and is a major risk factor for significant neonatal mortality and morbidity [1]. Electronic intra partum fetal heart rate monitoring was pioneered by Edward Hon in the late 1950's. In the following years the fetal monitor was over whelmingly accepted. Inter observer and Intra observer variations in interpretation of CTG is common. Medical, social and economic advances transformed maternal birth outcomes in the 19th and 20th centuries.

It aims at the timely identification and rescue of fetus at risk of neonatal mortality, morbidity and long-term morbidity from intra partum hypoxic insult.

The basic principle of intrapartum monitoring is to detect impending fetal hypoxia with the aim of preventing subsequent acidemia and cell damage [2]. It became commercially available in the 1960s, Subsequently, the intrapartum use of EFM increased rapidly, with the emphasis on improving fetal birth outcomes by detecting fetal hypoxia.

It helps the clinician to intervene the labour in appropriate time either by instrumental or by caesarean section in order to improve the perinatal outcome. The initial response to chronic or slowly developing hypoxia is to increase cardiac output and redistribute this to the brain and heart [3].

The increase in cardiac output is achieved by an increase in heart rate. This may be followed by a reduction in heart rate variability due to brainstem hypoxia. Continued and worsening hypoxia will eventually produce myocardial damage and heart-rate decelerations [4].

Acute hypoxia, in contrast, results in a decrease in the fetal heart rat e (bradycardia or decelerations) initially produced by chemoreceptor -mediated vagal stimulation but eventually by myocardial ischaemia. Metabolically, progressive fetal hypoxia results firstly in a respiratory acidaemia and secondly in a metabolic acidaemia with tissue injury. The expectation was that EFM would reduce hypoxia induced intrapartum perinatal effects. Studies have showed that EFM is not found to be an effective predictor of fetal hypoxia. Hence studies are still going on.

Careful interpretation of FHR patterns could be a useful screening test for fetal asphyxia. However, supplementary tests like fetal scalp pH, fetal ECG are required to confirm the diagnosis and to identify the large number of false positive patterns to avoid unnecessary intervention [5].

Here in this dissertation the correlation between non - reassuring CTG and umbilical cord arterial blood pH analysis was done along with perinatal outcome of the fetus.

Aims and Objectives

1. Correlation of non-reassuring CTG using krebs scoring system with umbilical cord arterial blood pH.
2. To find out the perinatal outcome of non-reassuring CTG and abnormal cord blood pH.

Materials and Methods

The present study is a prospective study conducted in the department of Obstetrics and Gynaecology in Sree Balaji Medical College and Hospital, Chennai. 100 patients were included in the study from January 2016 to September 2017.

Inclusion criteria

- Gestational age > 34 weeks Singleton
- Vertex presentation
- Cephalic presentation

Exclusion criteria

- Elective LSCS
- Breech
- Anomalous babies
- Multifetal Gestation
- Gestational age < 34 weeks

Examination method

All patients were subjected to CTG, in the active phase of labour. The CTG used in the study was Edan F09 with the paper speed being 1 cm/min with an external transducer. Uterine contractions were recorded simultaneously CTG assessed objectively using Krebs scoring system every 30 minutes in active labour.

Five parameters used in scoring system were

1. Baseline Heart rate
2. Baseline variability
3. Amplitude (Frequency)
4. Acceleration
5. Deceleration

Each parameter scored 0 - 2, giving a total score of 10 Three groups were made from the total score, 0 - 4, 5 - 7, 8 - 10.

Figure 1: Showing CTG machine with trace.

Blood collection

Blood collection was performed following delivery, from immediately isolated segment (10 to 20 cm) of cord with two clamps near the neonate two clamps near the placenta. The importance of clamping the cord is underscored by the fact that delays of 20 - 30 seconds can alter both the PCO2 and pH. The cord was then cut between the two proximal and two distal clamps. Arterial blood was drawn from the isolated segment of cord into a 1 - 2 ml syringe that has been flushed with a heparin solution containing 1000 U/ml. The needle was capped, and the syringe transported on ice to the laboratory. (Although efforts should be made to transport the blood promptly, neither the pH nor PCO2 change significantly in minutes). Blood kept at room temperature for up to 6.

Figure 2: Shows Collection of cord blood.

Figure 3: Shows Arterial blood gas analyser.

Result and Analysis

Parity

Parity	Frequency (N)	%
Primi	60	60
Multi	40	40
Total	100	100.0

Table 1: Shows the Parity.

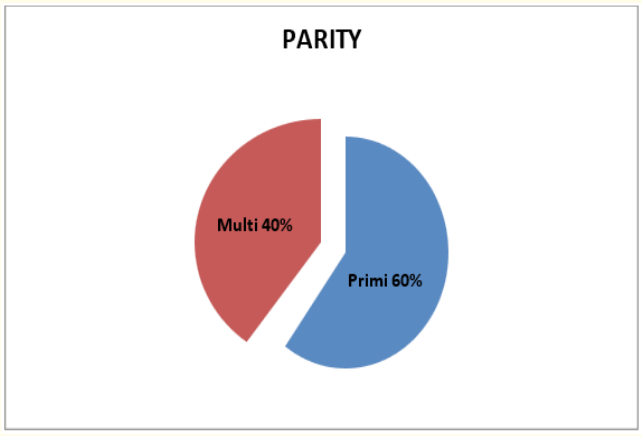

Figure 4: Shows the parity

Risk factors in Pregnancy

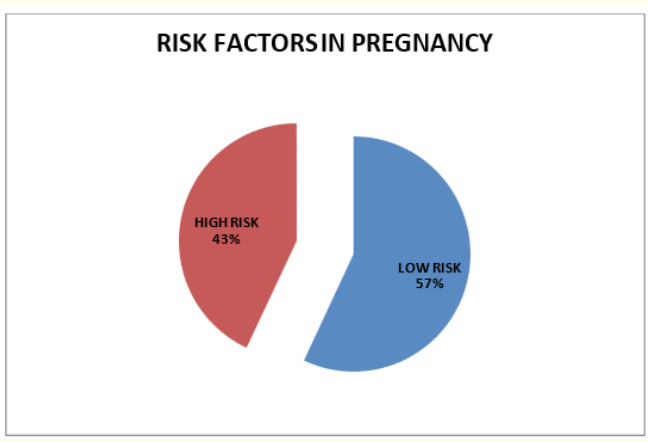

Figure 5: Shows the risk factors in pregnancy

Risks	Frequency (N)	%
Low risk patients	57	57
High risk patients	43	43
Total	100	100.00

Table 2: Shows the Risk Factors in Pregnancy.

Onset of labour

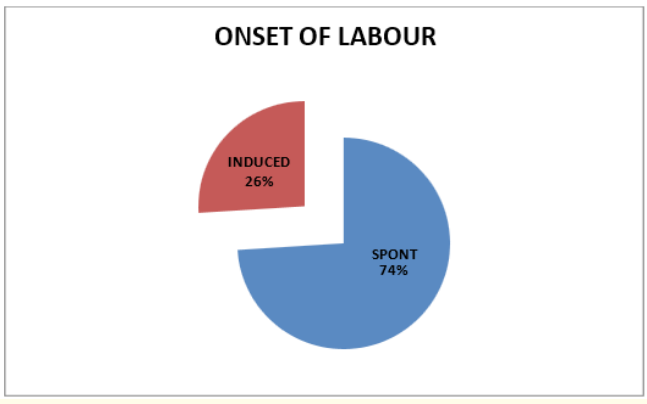

Figure 3: Shows the onset of labour.

Onset of Labour	Frequency (N)	%
Spontaneous	74	74
Induced	26	26
Total	100	100.00

Table 3: Shows the onset of labour.

Discussion

This study was conducted in 100 antenatal women to correlate between the non-reassuring fetal heart pattern and cord blood pH and its perinatal outcome.

Majority of women were primigravidae. 43 patients were having high risk factors like anaemia, preeclampsia, heart disease, Recurrent pregnancy loss, diabetes mellitus, and prolonged pregnancy 57 were low risk.

74 patients had spontaneous onset of labour pains and the rest 26 patients were induced with prostaglandins/oxytocics, 38 patients had ARM done, 39 patients had spontaneous rupture of membranes and remaining 23 had premature rupture of membranes of 100 patients, 61 had clear liquor, 20 patients had a grade I meconium stained liquor, 10 patients had a grade I Meconium stained liquor, 9 had a Grade III meconium stained liquor of 100 patients 35 delivered by spontaneous vaginal delivery, 06 patients delivered by vacuum, for 14 patients outlet forceps was applied. 45 patients delivered by LSCS. Of 45 LSCS, 30 were done for fetal distress.

A step down of CTG score was observed in our group of parturients. A step down of CTG score was observed in our group of parturients.

CTG scoring at ½ an hour prior to deliver y correlated well with umbilical arterial pH at birth.

1. P value- 0.01 for ½ an hour score. Sensitivity of CTG with a poor score (0 - 4) for the outcome as acidosis is 63.33%, specificity of the same was 96.3%.
2. PPV i.e. with a poor CTG score the probability of the acidosis in the neonate is 95%
3. NPV i.e. with the good CTG score 5 - 7/8 -10 the probability of delivery o f a non-acidotic neonate is 70.27%.
4. Accuracy of the test is 78.95%.

The probability of delivering a non-acidotic neonate is high with a good CTG score, whereas with a poor CTG score the probability of acidosis for the neonate is significantly increased [5-10].

Conclusion

In our prospective study umbilical cord blood pH values at the time of delivery were related to FHR patterns classified according to Krebs scoring system. There was a significant correlation ($P < 0.01$) between low CTG scores and acidosis. Rapid deterioration of CTG scores were found to require immediate intervention to prevent acidosis.

The fetus undergoes physiological stress during labour. Fetal morbidity and mortality may occur as a consequence of labour even in low risk patients. Cardiotocography is a simple, non-invasive recordable method of intrapartum fetal monitoring which can be used as a tool to detect hypoxemic event in the fetus in-utero during labour, enabling initiation of appropriate management. From the findings of this study, we can conclude that in presence of a low score CTG, there is higher possibility of intrapartum fetal acidosis while presence of a normal CTG indicates a minor possibility of intrapartum fetal acidosis.

Application of scoring system in interpretation of CTG in labour helps to reduce inter and intra observer variation in interpretation and provides the obstetrician a yard stick to measure fetal wellbeing in labour.

Immediately following birth, metabolic acidosis in the fetus can be detected by analyzing arterial and venous blood from the umbilical cord. Cord blood analysis for pH, pCO_2, and bicarbonate (HCO_3) and base deficit (BD) values is highly recommended in all cases of suspected fetal hypoxia/acidosis.

Thus, CTG is a simple test, easy to perform and can alert the obstetrician for necessary interventions in case of an abnormal CTG. It can detect fetal distress in labour, thus helping to reduce neonatal morbidity by early intervention in cases of abnormal tracings. From the analysis of this study, it can be concluded that an abnormal CTG should be managed appropriately, without any delay, in order to prevent acidosis in the neonate and adverse long-term sequelae. The obstetrician should be more vigilant in cases of indeterminate CTG tracings and monitor such labours closely.

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