

# Cardiotocography: Obstetric and Neonatal outcome

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## Abstract

**Background:** To analyze the indications of cardiotocography and to find out its impact on obstetric and neonatal outcome

**Methods:** A total of 210 women, who were more than 36 weeks pregnant and had some clinical indication for Cardio Tocography (CTG) monitoring, were included in the study. CTG was performed in antepartum and intrapartum period and pathological (Non reactive) traces were identified. The outcome was noted in terms of mode of delivery (Vaginal or Cesarean Section), fetal outcome (alive, still born neonatal deaths), meconium stained liquor, APGAR score, need for resuscitation and intensive care unit (ICU) admission. To achieve the objective, the results were evaluated in two groups. Group 1 included the women who had reactive pattern of CTG and group 2 included the women who had non reactive pattern of CTG.

**Results:** Reactive pattern was seen in 144 women while 66 women showed non reactive pattern of CTG. In reactive group 62.57% delivered vaginally, while in non-reactive group 27.27% delivered vaginally. In reactive group, 142 (98.61%) babies were born alive and 2 (1.38%) were still born. Out of 142 live born babies, there were 4 (2.81%) early neonatal deaths. In non-reactive group 62 (93.93%) babies were born alive and 4 (6.06%) were still born. Among 62 alive born babies in non reactive group, there were 10 (16.12%) early neonatal deaths. Meconium stained liquor was present in 23 (15.97%) babies of reactive group & 18 (27.27%) babies of non reactive group. APGAR score at birth was low (<6) in 44 (30.98%) babies of reactive group and 33 (53.22%) babies of non-reactive group. Resuscitation at birth was required for 44 (30.98%) babies of reactive group and 33 (53.22%) babies of non reactive group. Admission to intensive care unit was required for 24 (16.90%) babies in reactive group and 19 (30.64%) babies in non-reactive group.

**Conclusion:** Fetal compromise is evident in the presence of pathological pattern of CTG. Abnormal CTG necessitates cesarean section. Therefore, adjunctive methods are required to improve the sensitivity and specificity of fetal monitoring if unnecessary interventions are to be avoided.

**Key Words:** Cardiotocography, cesarean section, neonatal outcome.

## Introduction

Assessment of fetal well being has evolved over the years with the primary focus on fetal heart rate assessment. Until the second half of twentieth century, assessment of fetal condition depended on

very limited means, the growth of the uterus and its contents, the fetal movements perceived by the mother and intermittent auscultation of fetal heart beat with a mono or binaural stethoscope<sup>1</sup>. Intermittent auscultation of fetal heart rate has been practiced for most of the twentieth century<sup>2</sup>. Sudden absence of fetal movements in the second half of pregnancy was, at that time, not only a very emotional but also a serious diagnostic problem. This recurrent dilemma, whether the fetus had died in utero, formed the major impulse for the development of CTG<sup>1</sup>.

The electronic fetal monitoring (EFM) was developed in 1950 and became commercially available in 1960s<sup>3</sup>. Physicians learned to recognize qualitative features of fetal heart rate record that reflect fetal distress<sup>4</sup>. It was hoped that EFM could be a useful screening test for prediction of fetal asphyxia<sup>5</sup>. A normal CTG pattern is highly reassuring that the fetus is not acidotic; < 2% of babies with a normal pattern will have a pH < 7.25. However, the significance of an abnormal pattern is much more difficult to judge due to high incidence of false positive findings<sup>1</sup>. There is wide intra observer and inter observer variation in the interpretation of CTG even among experts and there is tendency to over report abnormalities<sup>6</sup> that results in increased incidence of unnecessary intervention particularly cesarean section. Fetal blood sampling may reduce the chances of unnecessary intervention but requires additional expertise, generates discomfort to mother, is invasive and requires repetitive procedures<sup>7</sup>. Therefore, in spite of its application on a large scale this technique is still subject to debate<sup>8</sup>.

## Patients and Methods

It was a comparative study conducted in the Department of Gynae & Obst, Unit II, Liaquat University of Medical & Health Sciences, Jamshoro from January 2008 to June 2008. Cardiotocography was performed in women admitted in labor ward, who were more than 36 weeks pregnant and had some risk factor that might predispose to fetal compromise. All patients with pre labor rupture of membranes, decreased fetal movements, suspected intrauterine growth restriction, antepartum hemorrhage,

hypertensive pregnancy, bad obstetrical history and postdate pregnancy were included in study. CTG was performed in antepartum & intrapartum period and pathological traces were identified according to International Federation of Obstetricians and Gynaecologists (FIGO) classification. The obstetric and neonatal out come were found out in reactive and non reactive CTG groups.

## Results

Cardiotocography was performed in 210 women admitted in labour ward with some clinical indication for CTG monitoring. Among these 144 (68.57) had traces classified as reactive pattern while 66 (31.42%) had non reactive pattern of CTG. Out of these 66 cases, 42 (63.63%) CTGs were performed in antepartum period and 24 (36.36%) were performed in intrapartum period. In reactive pattern majority were delivered vaginally (62.51%) , while in non -reactive group majority were delivered by caesarean section ( Table 1)

**Table 1**

Obstetric & Neonatal out come in Reactive & Non-Reactive CTG group			
Out Come	Reactive CTG Group (n=144)	Non Reactive CTG Group (n=66)	P Value
<u>Mode of Delivery</u>			
Vaginal	90 (62.50 %)	18 (27.27 %)	0.000
C-Section	54 (37.50 %)	48 (72.72 %)	
<u>Fetal Out Come</u>			
Alive	142 (98.61 %)	62 (93.93 %)	0.059
Still Birth	2 (1.39 %)	4 (6.06 %)	
<u>Born Alive</u>			
Discharge Alive	138 (97.19 %) (n=142)	52 (83.88 %) (n=62)	0.001
Early Neonatal death	4 (2.81 %) (n=142)	10 (16.12 %) (n=62)	
Meconium Stained Liquor	23 (15.97 %)	18 (27.27 %)	0.055
Apgar Score			
> 6	98 (69.02 %) (n=142)	29 (46.77 %) (n=62)	0.003
< 6	44 (30.98 %) (n=142)	33 (53.22 %) (n=62)	
Resuscitation Required	44 (30.98 %) (n=142)	33 (53.22 %) (n=62)	0.027
Admission to ICU	24 (16.90 %) (n=142)	19 (30.64 %) (n=62)	0.003

Regarding fetal out come in reactive group, 142 (98.61%) babies were born alive and there were 2 (1.38%) still births. Out of these 142 alive born babies there were 4 (2.81%) early neonatal deaths. In non reactive group, 62 (93.93%) babies were born alive and 4 (6.06%) were still birth (p=0.059). Among these 62 alive born babies, there were 10 (16.12%) early

neonatal deaths. Meconium stained liquor was found in 23 (15.97%) babies of reactive group and 18 (27.27%) babies of non reactive group (p=0.055). In reactive group 98 (69.01%) babies were born with good Apgar score while it was low (<6) in 44 (30.98%) babies. In non reactive group, 29 (46.77%) babies were born with good Apgar score while 33 (53.22%) were born with low Apgar score (p=0.008). Resuscitation at birth was required in 44 (30.98%) babies of reactive group and 33 (53.22%) babies of non reactive group (p=0.027). Admission to ICU was required for 24 (16.90%) babies in reactive group & 19 (30.64%) babies of non reactive group (p=0.003) (Table 1). Statistically significant differences were observed regarding obstetric and neonatal out come between reactive and non-reactive groups.

## Discussion

Sonography and Cardiotocography have been named as the minefields of obstetrics. Currently the majority of obstetric decisions to assist delivery of the baby by artificial means, for reasons of suspected fetal distress, relies on information gathered through the application of CTG. At the end of 20th century, it was estimated that 74% of all pregnancies in the USA were monitored electronically<sup>9</sup>.

The wide spread application of CTG has resulted in an increase in the number of obstetric interventions, particularly the incidence of Cesarean Section. The fact that, delivery by Cesarean Section is usual when CTG becomes abnormal was supported by the study which showed a high Cesarean Section rate (72.72%) in the presence of pathological pattern of CTG. Similar observation was made by Oladrian et al in a study which showed 72% Cesarean Section rate<sup>10</sup>. A study by Kulkarni and Shrotri also showed a progressive rise in operative deliveries for fetal distress from 5.17% in the reactive group to 28.5% in the ominous group<sup>11</sup>. Other studies also established the association between a high Cesarean Section rate and an abnormal CTG<sup>12,13</sup>. It was noticed that rate of Cesarean Section increased when CTGs were performed for low risk pregnancies. National Institute of Clinical Excellence (NICE), in its guidelines for CTG monitoring, recommends intermittent monitoring for low risk labor and continuous CTG monitoring for high risk labor<sup>14</sup>.

Apgar score at birth was better in reactive group as compared to non reactive CTG group. Chew et al in their study suggested that an abnormal CTG is indicative of fetus at risk having hypoxia and had

higher incidence of having cord arterial blood pH < 7.26 and Apgar score of < 6 at 1minute<sup>15</sup>. Similar observations were made in other studies<sup>16</sup>. However, some studies established no significant association between pathological CTG and fetal Apgar score<sup>17, 18</sup>. Apgar score is considered as a poor predictor of fetal hypoxia and acidosis, as it is affected by many other factors. Babies born with low Apgar, required resuscitation and some of them required ICU admission. The need of resuscitation and ICU admission were found more in non reactive CTG group than in reactive CTG group. Meconium stained liquor in a situation of high risk is of great concern. It was seen more commonly in non-reactive group (27.27%) than in reactive group (15.97%). Therefore, in all cases with meconium stained liquor and fetal heart rate traces not classified as normal, the possibility of fetal compromise must be considered.

Out of 144 patients with reactive CTG, 142 were delivered alive and 2 were still birth. Among these 142 alive born babies there were 4 (2.18%) early neonatal deaths. Out of 66 patients with non reactive CTG, 62 (93.93%) were delivered alive and 4 were still birth (6.06%). Among these 62 alive born babies in non reactive group there were 10 (16.12%) early neonatal deaths. Hence, an abnormal cardiotocogram is indicative of fetal compromise which was also demonstrated in another study.<sup>19</sup> Large randomized studies in high risk population provide evidence of an approximately 60% reduction in perinatal mortality due to fetal distress when EFM was applied as a routine in that high risk group<sup>1</sup>.

## Conclusion

CTG is a useful and indispensable adjunct to monitor the condition of endangered fetus. However, there is a need to develop a standardized and unambiguous definition of FHR tracing to reduce the incidence of false positive findings that may result in increased incidence of unnecessary intervention particularly caesarean section.

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