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Correlation of Cardiotocography with Intraoperative findings and neonatal outcome in caesarean section for non-reassuring fetal status

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ABSTRACT

Aims: To demonstrate the correlation of cardiotocography with intraoperative findings and neonatal outcome undergoing emergency cesarean section for non-reassuring fetal status.

Methods: It is a hospital based cross sectional study at maternity ward of Shree Birendra Hospital in Kathmandu with non-reassuring CTG who underwent cesarean section in a period of one year. Their CTG were correlated with their intraoperative findings and neonatal outcome such as meconium stained liquor, nuchal cord, Apgar score at birth, NICU admission, perinatal mortality and stillbirth.

Results: Fifty four patients were recruited. Most common operative finding was meconium stained liquor (35.2%); and cardiotocographic abnormality was variable Deceleration (37%). Variable deceleration and late deceleration had significant correlation with meconium stain liquor and nuchal cord. Apgar score ≤ 7 at 5 minute was 7.4%. NICU admission was 13% with common abnormality as late Deceleration.

Conclusion: CTG pattern of variable and late deceleration had correlated with the meconium stained liquor and nuchal cord only. There was no relation with neonatal outcome in terms of Apgar score and admission rate.

Keywords: Apgar, cardiotocography, cesarean section, meconium stained liquor, non-reassuring

INTRODUCTION

Fetal surveillance is very important for the delivery of healthy baby.¹ Cardiotocography (CTG) record shows fetal heart rate changes and its relationship to uterine contractions which is helpful in detecting fetal distress.² Caesarean section rates are rising in trend. One of the most common causes for caesarean section is fetal distress. Widespread use of CTG may risk increasing the rate of Caesarean section. Continuous CTG monitoring should be done when abnormalities are detected during intermittent fetal auscultation and in cases of high risk pregnancy which are prone to

to fetal hypoxia /acidosis.³

Not all fetuses with abnormal fetal heart pattern have adverse perinatal outcome. It is 20 minute recording of fetal heart and uterine contraction by using CTG machine in labour ward as it is very simple, noninvasive and quick.⁴ CTG may identify abnormal fetal heart rate pattern as the presumptive sign of fetal distress at the cost of rising Caesarean section because the false positivity reaches to 50-80%.^{5,6,7} A Cochrane Collaboration review has shown that use of CTG reduces

the rate of seizures in the newborn but there is no clear benefit in the prevention of cerebral palsy, perinatal death and other complications of labour. These abnormal CTG traces may or may not be related to intraoperative findings of meconium stained liquor or low Apgar at birth or nuchal cord. Many fetuses show heart rate changes without showing poor outcome and CTG has been criticized for unnecessary increase in rate of operative deliveries.^{8,9,10} Hence the purpose of this study is to observe the relationship of CTG with post-cesarean fetal outcome.

METHODS

It is a hospital based cross sectional study of women admitted in maternity postoperative ward of Shree Birendra Hospital (SBH) with non-reassuring CTG who underwent cesarean section fulfilling inclusion criteria in a period of one year from December 2019 to December 2020. All Cesarean sections performed for non-reassuring CTG in singleton live term pregnancies with cephalic presentation were taken; and congenital anomalies were excluded. Written informed consent was taken after ethical approval. Fetal heart tracing was recorded for a period of 20 minutes. Maternal age, parity, associated risk factors and abnormal fetal heart rate patterns in terms of FHR, baseline variability, acceleration and deceleration were recorded. Neonatal outcome recorded in terms of one and five minute Apgar score, birth weight, NICU admission, stillbirth and perinatal mortality. Patients were followed till discharge. Intraoperative findings like meconium stained liquor, antepartum hemorrhage, nuchal cord and decreased liquor volume were also recorded. Chi squared test was done using SPSS data sheet.

RESULTS

Total number of 1132 women delivered during the study period. Out of these 54 women underwent emergency cesarean section for nonreassuring CTG. The mean age of the women in the study group was 21-25 years (44.4%) followed by 26 to 30 years (25.9%) and 31 to 35 years (25.9%) respectively; 57.4% were multiparous and 42.6% primiparous. Most common operative findings were presence of meconium stained liquor (35.2%) followed by Nuchal cord (24.1%), less liquor volume (14.8%) and antepartum hemorrhage (5.6%). There was no apparent cause in 18.5%. Common CTG findings were variable deceleration (37%), late deceleration (24.1%), tachycardia (20.4%) and persistent bradycardia (18.5%). Meconium stained liquor and nuchal cord were statistically significant for variable and late deceleration of fetal heart abnormality. [Table-1]

NICU admission was 13% which was more common with late deceleration (42.9%) followed by persistent bradycardia (28.6%) and variable deceleration (28.6%). Apgar score ≤ 7 at 5 minute was 7.4% which was more common with late deceleration of fetal heart abnormality followed by persistent bradycardia and variable deceleration. NICU admission rate and Apgar score were not statistically significant. There was no perinatal mortality. Meconium stained liquor was the most common operative finding with late deceleration and NICU admission. [Table-2]

DISCUSSION

Many studies have been undertaken to study the importance of CTG monitoring. In our study out of 54 enrolled cases, majority belonged to age group 21 to 25 years(44.4%) which correlated with the

Table-1: Correlation of fetal heart abnormality with intraoperative findings (N=54)

Finding	MSL			NC			APH			Oligo			AN			
	No	Yes	p-value	No	Yes	p-value	No	Yes	p-value	No	Yes	p-value	No	Yes	p-value	
PB	No	27	17	0.265	32	12	0.249	42	2	0.497	38	6	0.609	38	6	0.053
	Yes	8	2		9	1		9	1		8	2		6	4	
VD	No	16	18	0.00	31	3	0.00	32	2	0.89	31	3	0.106	26	8	0.216
	Yes	19	1		10	10		19	1		15	5		18	2	
LD	No	35	6	0.00	28	13	0.02	38	3	0.32	33	8	0.084	31	10	0.049
	Yes	0	13		13	0		13	0		13	0		13	0	
Tac	No	27	16	0.538	32	11	0.608	41	2	0.566	36	7	0.549	37	6	0.088
	Yes	8	3		9	2		10	1		10	1		7	4	

PB-Persistent bradycardia, VD-Variable deceleration, LD-Late deceleration, Tac-Tachycardia, MSL-Meconium stained liquor, NC-Nuchal cord, APH-Antepartum hemorrhage, Oligo-Less liquor volume, AN-Apparently normal

Table-2: Correlation of CTG with Neonatal outcome

CTG	Finding	NICU admission			Apgar in 1 min			Apgar in 5min		
		No	Yes	p-value	AS<7	AS≥7	p-value	AS<7	AS≥7	p-value
PB	No	39	5	0.463	22	22	0.252	3	41	0.729
	Yes	8	2		3	7		1	9	
VD	No	29	5	0.619	14	20	0.325	3	31	0.604
	Yes	18	2		11	9		1	19	
LD	No	37	4	0.213	17	24	0.206	2	39	0.208
	Yes	10	3		8	5		2	11	
Tac	No	36	7	0.151	22	21	0.156	4	39	0.293
	Yes	11	0		3	8		0	11	

PB-Persistent bradycardia, VD-Variable deceleration, LD-Late deceleration, Tac-Tachycardia

study done by Joshi et al¹¹ (55%) and Rahman et al¹² (42.5%) whereas in the study by Kansal et al¹³ 44% belonged to age group 26 to 30 years; 42.6% of the patients were primigravid while 57.4% were multigravid which were comparable with the study done by Kumar VR et al (56% and 44%) and Rana P et al (64% and 36%) respectively.^{14,15} There was no significant correlation of fetal heart rate patterns, neonatal and intraoperative findings with maternal age, parity and fetal weight.

Meconium stained liquor was 35.2%, variable Deceleration was 37% in our study which is very much more than the study done by Bhartiya et al¹⁶ whose result was 1% and 2% and Rana et al¹⁵ whose result was 17.5% and 15.5% respectively. This study was done on low risk pregnant women whereas our study was done on both high and low risk pregnant women. Study done on 638 women by Quadar et al reported no abnormal intraoperative findings in 220 cases (34.5%) and the rest had meconium stained liquor (23.5%), APH (21.9%) and nuchal cord (15.7%). Emergency cesarean section for non-reassuring CTG with no abnormal operative findings may require placental histopathology.¹⁷

Study done by Roy et al¹⁸ on 217 patient, the most common CTG abnormality was persistent bradycardia (48.8%) followed by late deceleration (17.5%) and 5min Apgar score was <7 in 15.2% with NICU admission rate of 15.2%. Thus there was no correlation between CTG and neonatal outcome. Similar findings obtained from our study for NICU admission (13, 5min <7 Apgar score (7.4%) and late deceleration (24.1%) but fewer persistent bradycardia (18.5%).

Higher rate of meconium stained liquor and nuchal

cord was reported by Bhatia¹⁹ (47.1% and 33.3%) and Mittal et al²⁰ (46.6% and 41.1%) than our study.

Kumar et al²¹ correlated abnormal CTG findings with meconium stained liquor in 86.3% whereas in Mittal²⁰ it was found 46.6% which were statistically significant. The author correlated abnormal tracings with neonatal mortality and morbidity and concluded that electronic fetal monitoring reduces hypoxia related death of neonate by 60%. Their correlation with oligohydramnios and abnormal CTG findings were 67.9% and in Mittal study 32.2% whereas Nuchal cord 14.13% and 41.1% all were statistically significant.

This study was limited by the intermittent nature of cardiotocography tracing and lack of confirmation by fetal blood parameter.

CONCLUSIONS

Variable deceleration and late deceleration could correlate with meconium stained liquor and nuchal cord but there was no relation to neonatal outcome in terms of Apgar score and neonatal admission rate. One-fifth had no any abnormality intraoperatively.

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