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ORIGINAL ARTICLE

Intrapartum Cardiotocography Status (Reactive or Non Reactive) in Pregnant Women Presenting with Meconium-stained Liquor and their Perinatal Outcome

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ABSTRACT

Objective: To determine the prevalence of reactive intrapartum cardiotocography status in pregnant women presenting with meconium-stained liquor (MSL) and their perinatal outcome.
Study design: Descriptive Cross-sectional study
Study setting: This study was conducted in the department of Obstetrics & Gynaecology, Civil Hospital, Karachi.
Duration of study: September 10, 2022 to March 9, 2023.
Subject and Methods: All those patients fulfilling the inclusion and exclusion criteria were included in the study after taking informed consent and demographic data was obtained. The status of the amniotic membranes, if ruptured whether artificially or spontaneously, colour and amount of liquor was observed clinically and was also recorded. CTG was performed in every patient for 30 minutes in the left lateral position on admission as well as a monitoring tool in labour at an interval of more than 4 hours. The CTG was classified as reactive or non-reactive. By visual examination meconium stained liquor was classified as grade 1, 2 and 3 after spontaneous rupture of membrane or artificial rupture of membranes. The fetal outcome in terms of APGAR score at 1 minute and 7 minute and NICU admission was recorded. SPSS - 27 was used for data analysis.
Results: 114 (76%) delivered vaginally and 36 (24%) underwent for C-section. 61 (40.7%) of the cases had MSL grade-1, 51 (34.3%) had MSL grade-II and 38 (25%) had MSL grade-III. Reactive Intrapartum Cardiotocography was found in 133 (89%) Pregnant Women presenting with Meconium Stained Liquor (MSL). Out of them, 40 (80%) neonates with reactive cardiotocography were admitted in NICU. Statistically significant difference was observed in the APGAR score at 1 minute and at 7 minute among the reactive and non- reactive neonates.
Conclusion: Increasing grades of meconium stained liquor were associated with cardiotocography abnormalities. Increasing grades of meconium stained liquor and cardiotocography abnormalities were associated with increased operative interference.
Keywords: Amniotic fluid, CTG, Intrapartum, perinatal outcome

INTRODUCTION

Meconium stained liquor is one of the abnormalities of amniotic fluid. Meconium staining of liquor is found in about 12-14% of all pregnancies[1]. The presence of amniotic fluid stained with meconium is a subject of importance when considering intrapartum management. Studies have reported that on average 69% of new-borns pass meconium by 12 hours of age, but some foetuses pass meconium prior to birth as well[2]. The presence of meconium in amniotic fluid and its relation to foetal compromise is a debatable topic. Some believe that it is a sign of impending or ongoing foetal deterioration, whereas other investigators believe that itis not associated with foetal hypoxia, acidosis or foetal distress.2 Meconium stained liquor is an area of concern for both the obstetricians and paediatricians as it increases meconium aspiration syndrome, birth asphyxia, operative delivery and neonatal intensive care unit (NICU)admissions[3].

Cardiotocography (CTG) is a monitoring tool which records changes in foetal heart rate (FHR) during labour and has enhance our ability to assess fetal distress. However, when it is used alone, it was used to have high sensitivity (87%) but low specificity (66%). Its negative predictive value is 92% and positive predictive value is 54%. Therefore, normal CTG is more predictive of normal outcomes than abnormal CTG regarding abnormal outcomes[4]. Therefore, it leads to an increase in the number of operative deliveries all over the world. It is also a fact that non-reassuring fetal heart rate assessed by cardiotocography alone does not correlate well with adverse neonatal outcome[5]. A combination of abnormal CTG findings coupled with meconium-stained amniotic fluid was known to be associated with an increased risk of adverse perinatal outcomes[6]. Few studies support the combined approach using CTG along with meconium-stained liquor. The presence of abnormal fetal heart rate (FHR) tracing patterns in meconium-stained amniotic fluid patient indicates an increased risk of perinatal morbidity[7] Neither of the parameters are significant alone but their combination increases that predictive value[8]

The present study was designed to determine the prevalence of reactive intrapartum cardiotocography status in pregnant women presenting with meconium-stained liquor and their perinatal outcome. There was little evidence linking meconium stained liquor to poor perinatal outcome and clear amniotic fluid is frequently considered a reassuring sign during labour. Still very few studies were available in this area especially in developing countries. The results of the study might be different due to demographic profile of the patients and would give the insight to deal the patient accordingly. Due to scarcity of data, the work on this subject would add benefits.

METHODOLOGY

The study was carried out over a period of six months from September 10, 2022 to March 9, 2023 in the department of Obstetrics & Gynaecology, Civil Hospital, Karachi after the approval of synopsis from hospital's ethical review committee. A total of 150 women of aged between 18 to 44 years with > 37 weeks of gestational age, any party with singleton pregnancy and presented with MSL and was allocated to intrapartum monitoring by CTG were included via non-probability sampling technique. Women with previous history of caesarean section, malpresentations, oligohydramnios and Intra Uterine Growth Restriction, high risk pregnancy (e.g. pre-existing maternal disease and complicated obstetrical history), congenital malformations in the foetus were excluded. An informed consent was taken after explaining the purpose and procedure of the study. Baseline data was obtained. The status of the amniotic membranes, if ruptured whether artificially or spontaneously, colour and amount of liquor was observed clinically and was also recorded. CTG was performed in every patient for 30 minutes in the left lateral position on admission as well as a monitoring tool in labour at an interval of more than 4 hours. The foetal heart transducer and uterine

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pressure transducers was applied and the readings were recorded. The CTG was classified as reactive if there was baseline fetal heart rate (FHR) < 100 bpm, reduced or increased variability or sinusoidal pattern of FHR, Repetitive late or prolonged decelerations for >30 min, or >20 min if reduced variability (decelerations are defined as repetitive when associated with >50% contractions) and deceleration >5 minute. By visual examination meconium-stained liquor was classified as grade 1, if MSL was translucent, light-yellow green in color, grade 2, if MSL was opalescent, deep green and light yellow in colour and Grade 3 if MSL was is opaque and deep green in colour. Delivery was expedited and mode of delivery was noted. The fetal outcome in terms of APGAR score at 1 minute and 5 minute and NICU admission was recorded.

Data was entered and analyzed by using SPSS version 26. Mean + sd were computed for quantitative data, whereas, frequency and percentages were calculated for qualitative data. Comparison of MSL grading and fetal outcome like NICU admission with CTG status (reactive or non-reactive) was made using Chi-square test. The APGAR score at 1 minute and 5 minute was compared between reactive and non-reactive CTG status using t-test. Effect modifiers were controlled through stratification. Post stratification Chi square test/fisher exact test was applied for qualitative outcome variables and t-test for quantitative outcome variables. P value < 0.05 was considered as significant.

RESULTS

The mean age of the patients was 27.39±4.40 years and mean BMI was 30.35+6.72 kg/m^2, mean gestational age was 40 + 2 weeks, mean duration of rupture of membrane was 8 + 6 hours and mean duration of labour was 21.45 + 5.7 hours. The APGAR score at 1 minute was 0.8±0.8 and at 5 minute it was 0.7±0.2. Out of 150 women, 121 (80.6%) were booked and 29 (19.4%) were unbooked. 137 (91.3%) were admitted through outpatient department and 13 (8.6%) were admitted through emergency department. 21 (14%) were diabetic, 11 (7.3%) were hypertensive and 47 (31%) were anemic. 114 (76%) delivered vaginally and 36 (24%) underwent for C-section, as shown in table # 20. 61 (40.7%) of the cases had MSL grade-1, 51 (34.3%) had MSL grade-II and 38 (25%) had MSL grade-III, as shown in table # 1.

Reactive Intrapartum Cardiotocography was found in 133 (89%) Pregnant Women presenting with Meconium-Stained Liquor (MSL), as shown in figure#1.

Table # 1: Baseline Characteristics of the Patients

Baseline Characteristics	Mean + SD/n(%)
Maternal Age	27.39±4.40 years
Maternal BMI	30.35+6.72 kg/m^2
Gestational Age	40 + 2 weeks
Booking status • Booked • Un-booked	 121 (80.6%) 29 (19.4%)
Parity • Primipara • Multipara	 75 (50%) 75 (50%)
Mode of Admission OPD Emergency	 137 (91.3%) 13 (8.6%)
Duration of rupture of membrane	8 + 6 hours
Duration of labor	21.45 + 5.7 h
Birth Weight	2.5 + 0.8 kg
APGAR Score at 7 minutes	0.7±0.2
Co-Morbidities • Diabetes • Hypertension • Anemia	 21 (14%) 11 (7.3%) 47 (31%)
Mode of Delivery • Vaginal • C-section	 114 (76%) 36 (24%)
MSL grading • Grade-I • Grade-II • Grade=III	 61 (40.7%) 51 (34.3%) 38 (25%)

Table # 2: Comparison of CTG Status respect to Baseline Characteristics in Pregnant Women presenting with Meconium-Stained Liquor (MSL)

APGAR Score	CTG Status		P-value
	Reactive	Non-Reactive	
APGAR Score at 1 minute	0.84±0.04	0.67±0.02	0.000
< 5	25	06	0.000
> 5	50	69	
APGAR Score at 5 minutes	0.71±0.06	0.5±0.04	0.000
< 5	20	03	0.000
> 5	41	86	
NICU Admission			
Yes	40	10	0.017
No	93	07	

A total of 50 (33.5%) neonates were admitted in NICU, out of them 40 (80%) had reactive cardiotocography. 47 (77%) of the MSL grade-1, 49 (96%) of MSL grade-II and 37 (97.3%) of MSL grade-III cases had reactive cardiotocography. The APGAR score at 1 minute and at 7 minute among the reactive and nonreactive cases were compared, significant difference was observed, with statistically significant difference, as p-value was < 0.05, as shown in table # 2.

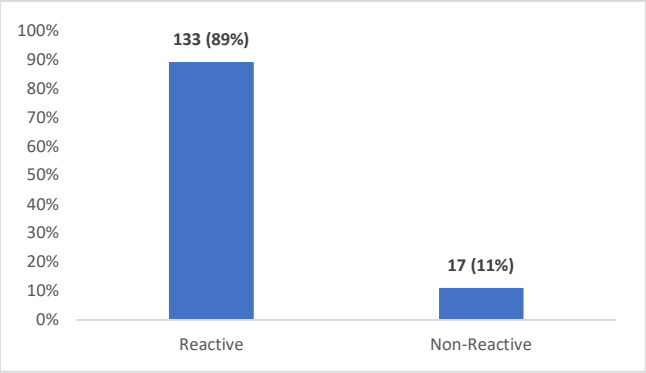

Figure # 1: Prevalence of Reactive Intrapartum Cardiotocography Status in Pregnant Women presenting with Meconium-Stained Liquor (MSL)

DISCUSSION

Meconium passage may occur as a normal physiology that reflects foetal outcomes. It can also be a sign of foetal hypoxia or increase of vagal activity due to cord compression. Usually there is association of thick meconium with poor perinatal results. The precise cause for meconium passage is poorly known. It can be reflection of compensated foetal distress as evidenced by few neonates who have acidosis during labour. Foetal hypoxia either acute or chronic can cause meconium passage. Meconium-stained liquor with no foetal heart rate abnormality does not suggest foetal compromise and there is no requirement of intervention. Foetal condition in labour assessment is commonly done by Foetal Heart Rate (FHR) and by looking for meconium in amniotic fluid.[11] Meconium aspiration in utero can cause Meconium Aspiration Syndrome(MAS), which is a leading cause of perinatal death.[12] CTG is the tool for monitoring foetal heart rate during labour. Cardiotocography is a monitoring tool which involves graphically recording of foetal heart activity (cardio) and its relations to uterine contractions.[13] Both are recorded at the same time simultaneously and continuously through uterine quiescence and contraction. The CTG machine records FHR trace and uterine contractions against time.

In present study, the percentage of normal CTG was maximum in grade 1 MSL (33%) and percentage of reactive CTG was maximum in grade 3 MSL (97.3%), which is comparable to studies done by Priyad harshini M et al,[14] Khillan S et al[15] and Ayesha Hussain, et al.[16] They revealed that pathologic CTG patterns are more common with grade 3 MSL, while in grade1 MSL normal CTG patterns are more common.

Further, this study we found that, maximum number of patients who had reactive CTG findings had caesarean section (70%), while maximum number of patients who had normal CTG findings had normal vaginal delivery (19%). The correlation of CTG changes and mode of delivery was found to be significant as the p value is 0.0001. Similarly, a significant association was found between MSL and CTG status as p-value = 0.000. A study done by Joshi H et al (58) showed that, 67% patients had normal CTG, out of them 39 (58%) had normal vaginal delivery, 6 (9%) had instrumental delivery and 22 (33%) had caesarean section. 21% patients had suspicious CTG, out of them 9 (43%) had normal vaginal delivery, 1 (5%) had instrumental delivery and 11 (52%) had caesarean section. 12% patients had pathologic CTG, out of them 1 (8%) had normal vaginal delivery, 1 (8%) had instrumental delivery and 10 (84%) patients had caesarean section. This shows that maximum number of patients who had pathologic CTG findings had caesarean section, while maximum number of patients who had normal CTG findings had normal vaginal delivery. The findings were comparable with our study.

The present study showed that, mean APGAR score at 1 minute was 0.85±0.06 and at 5 minute, it was 0.76±0.05. The correlation of CTG changes and APGAR score at 5 min is statistically significant as p value is 0.0001. A study done by Kumar BV et al (59) showed that, 17.2% patients who had meconium-stained fluid with normal tracing had low APGAR score, while 32.8%patients who had meconium-stained fluid with abnormal tracing had low APGAR score. This illustrated that more no of patients with abnormal tracings had low APGAR score as compared with normal tracing. The findings are comparable with our study.

Besides, this study observed that, 93 (66.43%) neonates required NICU admission. The rate of NICU admission in reactive CTG was 68.3% and non-reactive CTG was 31.7% with statistically significant difference as p-value < 0.05. The results of current study are in line with the findings of the study conducted by Ayesha Hussain, et al,[16] showed the higher prevalence of reactive intrapartum cardiotocography status in pregnant women presenting with meconium-stained liquor i.e. 91.5%. The NICU in reactive CTG was 68.3% and non-reactive CTG was 31.7%.

Limitations of the study: Use of non-probability sampling technique, small sample size and single centered study may limit the generalizability of the findings.

CONCLUSION

Reactive Intrapartum Cardiotocography was found in 133 (89%) Pregnant Women presenting with Meconium-Stained Liquor (MSL), 47 (77%) of the MSL grade-1, 49 (96%) of MSL grade-II and 37 (97.3%) of MSL grade-III cases had reactive cardiotocography. (83.3%) of the patients underwent for c-section had reactive CTG. Increasing grades of meconium-stained liquor were associated with cardiotocography abnormalities. Increasing grades of meconium-stained liquor and cardiotocography abnormalities were associated with increased operative interference. Increasing grades of meconium-stained liquor and cardiotocography abnormalities were associated with low APGAR score at 1 min and 5 min and increased need for NICU admissions. However, further multicentered studies with larger sample size may be conducted to firm up conclusion.

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