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ORIGINAL ARTICLE

Perinatal outcome in babies born through meconium stained liquor in Shree Birendra Hospital

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Abstract

Introduction: Meconium stained amniotic fluid has long been considered to be a bad predictor of fetal outcome. Presence of meconium in amniotic fluid is a potentially serious sign of fetal compromise and is associated with poor perinatal outcomes. This study was undertaken to find out the perinatal outcomes in babies born through meconium stained liquor at Shree Birendra hospital.

Method: This was a prospective cross sectional study conducted in department of obstetrics and gynecology of Shree Birendra Hospital over a period of 1 year, from 1st Mar 2019 to 30th of Feb 2020. A total of 68 pregnant women in labor after 37 completed weeks with singleton pregnancy with cephalic presentation with meconium stained amniotic fluid were enrolled in this study after taking detailed history and performing complete examination.

Result: Incidence of thin meconium staining was 7(10.3%) cases; moderate meconium 44(64.7%) and thick meconium 17(25%). Out of 68 cases, intrauterine fetal heart rate abnormalities were observed in 32(47.1%). Forty-eight (70.58%) mothers with meconium stained liquor underwent cesarean section. Low APGAR scores were more common in neonates born with thick meconium. Twenty-seven (39.70%) of total neonates born through meconium stained amniotic fluid required resuscitation. Neonates born through thick meconium required more invasive resuscitation. Similarly, signs of respiratory distress were more commonly seen in thick meconium group. Five (7.35%) of neonates were admitted in neonatal intensive care unit, in which 80% were from thick meconium group and 20% from moderate group. Three (4.41%) required mechanical ventilation; all of them were from thick group. Meconium aspiration syndrome was diagnosed in 1(1.47%) of total deliveries with frequency higher with thick meconium. Similarly, mortality rate was 1(1.47%) of total deliveries which included neonates from thick meconium group.

Conclusion: Meconium stained amniotic fluid is associated with intrauterine fetal heart rate abnormalities and increased rates of caesarean deliveries. Low APGAR score is observed in neonates with thick MSL. The rate of NICU admission in neonates born through MSAF are mostly from thick MSAF group.

Keywords: Meconium, Meonium Stained Amniotic Fluid, Meconium Stained Liquor

INTRODUCTION

Meconium is the first stool passed by a newborn infant. The word meconium was derived from Greek word "meconium arion" which means like opium or poppy like substances causing sleeping like state of the fetus in mother's womb.[1] The incidence of meconium stained amniotic fluid (MSAF) ranges from 3% to 27% and occurs predominantly during term and post-term gestation but is also reported in 5% of preterm deliveries.[2] The passage of meconium in utero is physiologic and is associated with functional gut maturation. When the fetus reaches the term or post term condition, the intestinal system is matured, and the vagal stimulation of the brain or the spinal cord causes peristaltic and rectal sphincter relaxation, which result in the meconium passage.[3]Placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios or maternal drug abuse (tobacco, cocaine) are predisposing factors of in utero passage of meconium.[4] Presence of meconium in amniotic fluid is a potentially serious sign of fetal compromise and is associated with increased perinatal morbidities and mortality.[5]

In utero passage of meconium indicates hypoxic stress and fetal compromise. MSAF is associated with fetal heart rate abnormalities, higher rate of caesarean delivery, instrumental delivery, fetal distress, low APGAR, low birth weight, Neonatal Intensive Care Unit (NICU) admission and neonatal death.[4]Caesarean sections is being performed twice as frequently in women presenting with MSAF than those with clear amniotic fluid. Mean APGAR scores has been reported to be significantly lower and the proportion of neonates with poor APGAR scores are higher if thick meconium is present than those born with thin meconium.[6] Several studies have reported an association between MSAF and the requirement for intensive resuscitation birth, NICU admission.[2,7]

As MSAF is associated with lots of adverse outcome of fetus and also maternal morbidity in view of increased rate of operative or assisted delivery and has been considered to be a bad predictor of fetal outcome, this study is carried out to find out immediate fetal outcome in deliveries with meconium stained liquor (MSL), mode of delivery in pregnant women with MSL, to see the babies need for immediate resuscitation, whether consistency/thickness of meconium has any relation to the outcome of neonate, need of NICU admission, need of Mechanichal ventilation, rate of Meconium aspiration syndrome and mortality. The primary objective of the study was to evaluate neonatal outcomes in babies born through meconium stained amniotic fluid. The secondary outcomes were to determine the effect of meconium stained amniotic fluid on intrauterine fetal heart rate variability and to determine the mode of delivery of babies born through meconium stained amniotic fluid.

METHOD

This prospective cross-sectional study was conducted at Shree Birendra Hospital's Department of Obstetrics and Gynecology from 1st Mar 2019 to 30th Feb 2020 after obtaining ethical clearance from institutional review committee (IRC) of Nepalese Army Institute of Health sciences (IRC ref. no: 245). The sampling method used was non-probability sampling.

All pregnant women in labor who had completed more than 37 weeks of gestation with visible meconium staining with singleton pregnancies with cephalic presentations and babies born through MSAF were included in the study.

The exclusion criteria were pregnancies less than 37 weeks of gestation, pregnant women in labor not sure of last menstrual date, presentations other than cephalic, stillbirth; pregnant women with co-morbidities such as hypertension, eclampsia, antepartum hemorrhage, intrauterine fetal death.

Informed written consent was taken from the study participants fulfilling the inclusion criteria. Pregnant women in labor with MSAF fulfilling inclusion criteria were taken as cases**.** Gestational age was calculated from maternal first day of last menstrual period (LMP). Vaginal examination was done to determine the status of the cervix (including dilatation, consistency, position and effacement), station of the head, and color and characteristics of meconium.

The staining of amniotic fluid was assessed visually at the time of rupture of membranes; and the obstetrician who attended the delivery determined the grade of staining. Consistency of meconium was divided as thin, thick and moderate. Thick meconium was characterized by opaque and deep green colored liquor whereas thin meconium was characterized by translucent and light yellow green colored amniotic fluid; and liquor with color in between deep green and light yellow-green as moderate meconium. MSL cases were managed as per the hospital protocol.

Fetal heart rate (FHR) monitoring was done with intermittent auscultation and Doppler ultrasound by attending obstetrician. Detailed information of fetal outcomes were recorded which are measured by APGAR scores at 1st and 5th minutes, fetal distress, requirement of neonatal resuscitation, development of meconium aspiration syndrome (MAS) and need for admission in neonatal intensive care unit (NICU), need of mechanical ventilation. Neonatal resuscitation was done according to Neonatal Resuscitation Protocol (NRP) based on 2015 American Heart Association (AHA) guidelines.

MAS was diagnosed if respiratory distress occurred immediately or within 24 hours after birth with

radiological evidence of aspiration into the lungs and need for supplemental oxygen, after exclusion of other causes of respiratory distress.

Babies were followed up till the time of discharge or mortality was noted. The diagnosis of MAS was made by clinical examination and/or other relevant investigations including chest x-ray. All data were entered and analyzed in Statistical Package for the Social Sciences (SPSS) 21. Values presented as either mean (with standard deviation) or percentage. For all determinants p-value <0.05 was considered statistically significant.

RESULT

All 68 cases completed the study. Mothers' age ranged from 19 to 38 years with mean age of 27.11±3.78 years. Majority of the mother were multigravida (Figure 1).

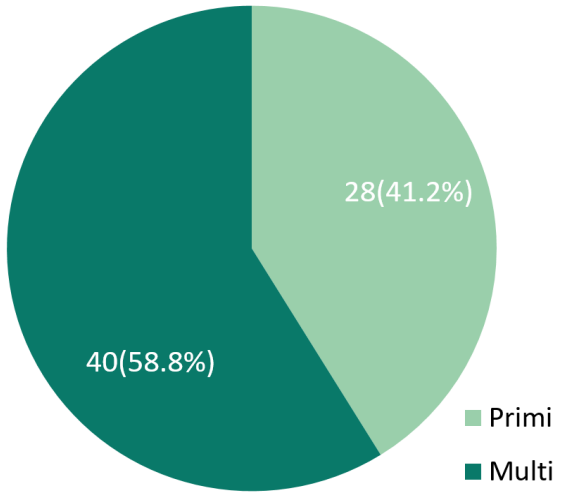

Figure 1. Parity of mother

Most of the cases had moderate meconium staining followed by thick and thin meconium staining (Table 1).

Table 1. Frequency of different meconium staining

Type of Meconium	*f* (%)
Thin	7(10.3%)
Moderate	44(64.7%)
Thick	17(25.0%)

Higher number of fetus with MSAF had normal heart rate (Figure 2). There was no statistically significant difference in abnormal FHR among different types of meconium staining (p =0.07).

Forty-eight (70.58%) of 68 mothers with MSL underwent LSCS. Normal vaginal delivery was the main mode of delivery for thin MSAF group. Incidence of LSCS was more in moderate meconium staining followed by thick meconium staining. (Table 2)

Low APGAR scores were seen in cases with thick MSAF as compared to moderate and thin MSAF (Table 3).

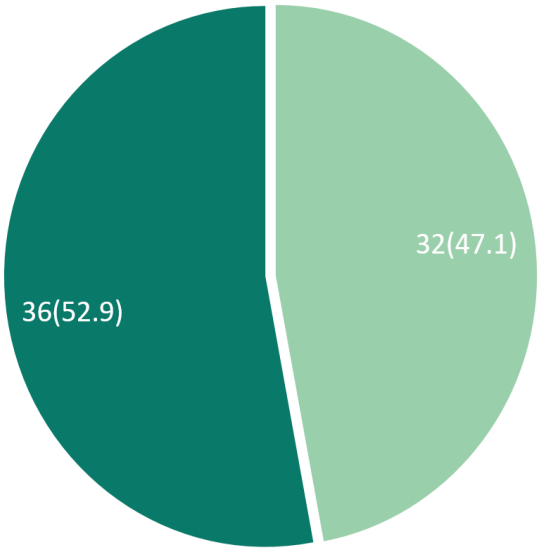

Figure 2. FHR abnormality in MSAF

Table 2. Mode of delivery of babies born through MSAF

Consistency of meconium	Delivered by			P value
	Vaginal	CS	Assisted	
Thin	6	1	0	
Moderate	9	34	1	0.005
Thick	3	13	1	

Table 3. Mean APGAR score at 1 and 5 minutes with respect to consistency of meconium

Consistency of meconium	APGAR-1 min Mean±SD	APGAR-5 min Mean±SD
Thin	6.1429±0.37796	8.1429±0.37796
Moderate	5.7955±0.59375	7.7273±0.65994
Thick	5.1765±1.18508	7.0588±1.47778
Total	5.6765±0.81847	7.6029±0.96413

There was statistically significant difference in mean APGAR score at 1 minute and 5 minute based on consistency of meconium staining (p- value = 0.007). Post-hoc analysis showed the mean APGAR score significantly differed with thick meconium staining (Table 4).

Table 4. Post hoc analysis of mean APGAR score and consistency of meconium

APGAR	Consistency of meconium	Consistency of meconium	P value
APGAR-1 min	Thin	Moderate	0.512
		Thick	0.018
	Moderate	Thick	0.017
APGAR-5 min	Thin	Moderate	0.508
		Thick	0.028
	Moderate	Thick	0.034

Less than half (27 out of 68) of neonates born through MSAF required neonatal resuscitation (Figure 3). All patients requiring NNR require stimulation, while none of the patients required chest compression and medication during NNR (See Table 5).

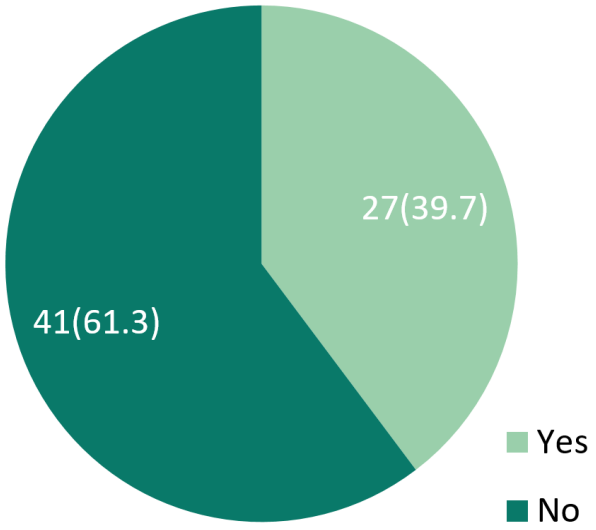

Figure 3. NNR requirement in babies born through MSAF

Table 5. Different interventions requirement in NNR in babies born through MSAF

Interventions	Yes	No
Stimulation	27	0
Suctioning	12	15
Bag & mask	4	23
ETT	1	26
Chest Compression	0	27
Medication	0	27

Table 6. Need of different interventions in relation to consistency of meconium

Interventions	Consistency of meconium			Total
	Thin	Moderate	Thick	
Stimulation	1	16	10	27
Suctioning	0	5	7	12
Bag & mask	0	0	4	4
Endotracheal Intubation	0	0	1	1

Signs of respiratory distress like dyspnea, tachypnea, cyanosis, grunting, nasal flaring, and chest retraction were found more commonly in thick MSAF compared to thin and moderate MSAF group (Table 7).

Table 7. Signs of respiratory distress

Consistency of meconium	Dyspnea		Tachypnea		Cyanosis		Grunting		Nasal Flaring		Retraction	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Thin	0	7	0	7	0	7	0	7	0	7	0	7
Moderate	1	43	1	43	0	44	1	43	0	44	0	44
Thick	4	13	4	13	5	12	4	13	4	13	4	13

Five (1 from moderate MSAF and 4 from thick MSAF group) out of 68 neonates were admitted in NICU. The thick MSAF group had significantly higher NICU admissions .i.e. 80% of neonates admitted to NICU were from thick MSAF group. MAS was diagnosed in 1 baby (1.47% of total MSL deliveries) and there was 1 perinatal mortality both of which were seen in thick MSAF group.

DISCUSSION

More often, during delivery, detection of MSAF causes anxiety among health workers as it is assumed to be an indicator of fetal distress. Fetal condition during labor is usually assessed by measuring the FHR and checking the presence of meconium in the amniotic fluid and it is often assumed that an abnormal FHR, especially in the presence of MSL, indicates hypoxia. The passage of meconium may be a normal physiologic maturational event on one hand and on other hand it reflects fetal hypoxia or increased vagal activity from cord compression. Although meconium is sterile, its passage into amniotic fluid is important because of the risk of developing respiratory distress, meconium aspiration syndrome and its sequelae. A significant association has been reported between the consistency of meconium and abnormal FHR patterns, increased rates of caesarean section, low APGAR scores and increased need of resuscitation, NICU admission and related other morbidity and mortality.

In our study, majority of babies were born through moderate MSAF (64.7%) followed by thick MSAF (25%) and thin (10.3%). In a study conducted by Rajput U, majority of babies were delivered through thin MSL (44%) followed by thick (35%) and moderate (21%).[8] In the study conducted by Bhatt RY, et al., the incidence of thin meconium was 52.1% and thick meconium was 49.7%.[9] Similarly, study done by Nadia Mohammad, et al. showed the incidence of thin MSAF 76.5% and thick MSAF 23.4%.[4] The findings of present study were not comparable to these studies as we divided consistency of meconium as thin, moderate and thick as per the protocol of the hospital and the consistency/degree of meconium staining may vary with individual.

The incidence of MSAF was slightly higher in multigravidas in our study which correlates with the study done by Thobbi et. al while the study conducted by Becker et alshows incidence of MSAF slightly higher in primigravidas.[10,11] Also the study conducted by Mundra et al showed the incidence of MSAF higher in primigravidas.[12]

In present study, 53.9% cases had normal FHR and abnormal FHR was seen in 47.1% at the time of detection of meconium while in the study conducted by Vaghela, abnormal FHR occurred in 25% of babies, more in association with thick meconium (13%)[1]. In study done by Thobbi et al, FHR abnormalities were high with thick MSAF group (45.8%).[10] Mode of delivery was significantly influenced by the presence of MSAF in our study. 48(70.58%)of mothers with MSL underwent LSCS which was comparable with the study

done by Vaghela. Rajput U in his study found that the mode of delivery is significantly affected by meconium staining of liquor and it is stated that LSCS were performed twice as frequently in women presenting with MSAF with incidence of LSCS being 83%.[8]

In present study, the APGAR score at 1 minute and 5 minute were studied as measures of neonatal outcome and statistically significant number of infants with thick meconium have low APGAR scores as compared to thin and moderate group. Thobbi, et al., found similar results in their studies.[10] In our study, 39.7% of neonates born through MSAF required NNR. A study done by Mohammad Nadia showed that most of the babies in thin and thick group do not usually require resuscitation and was not found statistically significant which was comparable to our study.[4] A study done by Kitsommart, et al., showed that the thick group required more respiratory support at birth which was relatable to our study.[2]

CONCLUSION

Meconium stained amniotic fluid is associated with intrauterine FHR abnormalities and increased incidence of LSCS. Low APGAR score is observed in neonates with thick MSL. The rate of NICU admission in neonates born through MSAF are mostly from thick MSAF group. There were certain limitations of our study. Thickness described by the obstetrician was subjective impression, and no clear standardization was applied. This study lacks long-term follow-up as we only studied short term outcomes.

DECLARATIONS

Acknowledgement

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Conflict of Interest

None

Funding

None

Ethical Clearance

It was taken from IRC of Nepalese Army Institute of Health Sciences (Ref no: 245).

Consent for the study

Written informed consent was taken from the patients.

Consent for Publication from Authors

All authors consented to the publication of the study.

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