International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2020; 4(2): 194-197
Received: 04-01-2020
Accepted: 06-02-2020

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A study of perinatal outcome in meconium stained amniotic fluid

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DOI: https://doi.org/10.33545/gynae.2020.v4.i2d.524

Abstract
Objective: To study the perinatal outcome in labour complicated with meconium stained amniotic fluid.
Materials and Methods: This was a prospective observational study conducted in the department of OBG, Al Ameen Medical College Vijayapura over a period of 18 months. A total of 200 pregnant women after 37 completed weeks with singleton pregnancy with cephalic presentation with meconium stained amniotic fluid were included in the study after taking detailed history and doing complete examination.
Result: Out of 200 patients, 55% were multigravidas and 45% primigravidas. Thin meconium was seen in 76% cases and thick in 24% cases. Association between type of meconium and neonatal complication was found to be statistically significant (P = 0.001). FHR abnormalities were high with thick MSAF group (45.8%). LSCS was mode of delivery for 45.8% patients in thick MSAF group and 54% delivered vaginally in the same group. Poor neonatal outcome in the form of low APGAR score at birth (27%), MAS (5%) and NICU admission (25%) was seen in 16% Thick MSAF group and 2% of thin MSAF group. Out of 10 babies who developed MAS 6 had uneventful postnatal life, 2 had neuro-developmental handicap and 2 mortalities.
Conclusion: MSAF with FHR abnormalities, increased rates of caesarean deliveries, caused birth asphyxia, MAS and increased NICU admission rates.

Keywords: Meconium stained amniotic fluid, meconium aspiration syndrome, birth asphyxia, foetal heart rate

1. Introduction

Meconium is the first stool of a newborn infant. It is a viscous greenish-black tarry substance made up of denuded intestinal epithelial cells, ingested lanugo hair, swallowed amniotic fluid, mucus, digestive enzymes, bile acids, and water. Its formation begins around 10-12 weeks of gestation and quantity increases as gestation advances. Meconium-stained amniotic fluid is noted in approximately 12% -16% of all deliveries [1].

'Meconium' is derived from the Greek word "mekonion" meaning poppy juice or opium which was thought to cause increased sleepiness of the fetus in mother's womb [2]**.** There is a strong evidence that most of the meconium passage occurs by each of three basic mechanisms as under:

1. As a physiologic maturational event,
2. As a response to acute hypoxia occurring late in pregnancy or
3. As a response to chronic intrauterine hypoxia.

Passage of meconium in the mature fetus is facilitated by myelination of nerve fibers and increase in parasympathetic tone and increase in the concentration of motilin. Meconium passed as a maturational event is of thin consistency in most cases. The newborns who have passed meconium during labour or in utero are in a state of compensated fetal distress. For short periods the state of compensation would persist. Perhaps a change in the fetal heart beats or a fall in the fetal scalp pH would suggest the end of the compensatory equilibrium and the intervention is indicated.

The maternal risk factors for meconium staining of amniotic fluid are hypertension, gestational diabetes mellitus, maternal chronic respiratory or cardiovascular diseases, post term pregnancy, preeclampsia, eclampsia. The fetal factors include oligohydramnios, intrauterine growth restriction, poor biophysical profile 3. MSAF is associated with higher rate of caesarean delivery, increased need for neonatal resuscitation and meconium aspiration syndrome 4. Aspiration of meconium by the fetus remains relatively common cause of perinatal morbidity and mortality.

2. Materials and Methods

A prospective study was conducted on 200 pregnant women in labour with meconium stained amniotic fluid admitted for safe confinement between November 2017 to September 2019 in the department of Obstetrics and Gynaecology, Al Ameen Medical College Vijaypura. During the study cases selected were pregnant women at term gestation with cephalic presentation with meconium stained amniotic fluid. Patients.

having malpresentation, multiple pregnancies, fetal malformation, intrauterine fetal demise, eclampsia, antepartum hemorrhage were excluded from this study. Patients detailed history, gestational age, per abdominal examination, per speculum and per vaginal examination were recorded in a pre-designed proforma. Fetal heart rate monitoring was done with intermittent auscultation. The rate of cervical dilatation, duration and progress of labour was noted by plotting the parameters on a partogram. The APGAR score of neonates at 1 and 5 minutes, NICU admission, the neonates who had meconium aspiration syndrome and birth asphyxia in thicK and thin group were recorded.

Results

Out of 200 cases of MSAF, thick meconium was seen in 24% cases thin meconium staining in 76% cases. Mean age of the mothers was between 21 to 25 years. There was no association between type of meconium and parity. Maximum cases were in the gestational age of 40-41 weeks. In the present study multigravidas with previous LSCS accounted for maximum number (10.4%thick and 7.2%thin) of cases with meconium staining of amniotic fluid. Normal vaginal delivery was the main mode of delivery for both thick (54.2%) and thin (82.2%) meconium staining. Incidence of lscs was more in thick meconium stained amniotic fliud (45.8%) low apgar scores were seen in cases with thick meconium stained liquor. The thick MSAF group had significantly higher (17%) NICU admissions. 45.8% fetuses with thick MSAF showed signs of fetal distress on non stress test as compared to 10.5%in thin MSAF group.

All cases of MAS were seen in thick MSAF group. In the present study total perinatal mortality was 1%.

Table 1: Evaluation of NST According To Type of Meconium

NST	Thick Meconium		Thin Meconium		p value
	N	%	N	%	
Fetal Distress	22	45.8%	16	10.5%	<0.001*
Reactive	26	54.2%	136	89.5%	
Total	48	100.0%	152	100.0%	

Note: * significant at 5% level of significance (p<0.05)

Fetal distress was found more commonly in thick MSAF while cases of thin MSAF had reactive NST.

Table 2: Mode of Delivery According To Type of Meconium

Mode of Delivery	Thick Meconium		Thin Meconium		p value
	N	%	N	%	
Emergency LSCS	22	45.8%	23	15.1%	<0.001*
Ftnd	26	54.2%	125	82.2%	
Vbac	0	0.0%	4	2.6%	
Total	48	100.0%	152	100.0%	

Note: * significant at 5% level of significance (p<0.05)

NVD was the main mode of delivery for both thick (54.2%) and thin (82.2%) meconium staining. LSCS was more often used for cases with thick (45.8%) meconium staining

Table 3: Stage of Labour When Meconium Was First Detected and Mode of Delivery in Primi

Stage of Labor	Meconium	Number Of Cases	Mode Of Delivery			p value
			Emergency LSCS	FTND	VBAC	
Active Phase	THICK	16	5	11	0	0.008*
	THIN	39	2	37	0	
Latent Phase	THICK	5	5	0	0	<0.001*
	THIN	30	6	24	0	
	Total	90	18	72	0	

NVD was the main mode of delivery when thin meconium was seen in active phase of stage one of labour. Cases with thick MSAF first detected in latent phase were delivered by LSCS

Table 4: Stage of Labour When Meconium Was First Detected and Mode of Delivery in Multigravida

Stage of Labor	Meconium	Number of Cases	Mode Of Delivery			p value
			Emergency LSCS	FTND	VBAC	
Active Phase	THICK	21	6	15	0	0.156
	THIN	36	4	30	2	
Latent Phase	THICK	6	6	0	0	0.001*
	THIN	47	11	34	2	
	Total	110	27	79	4	

All cases with thick meconium staining of amniotic fluid first detected in latent phase of labour were delivered by LSCS.

Apgar scores of less than 5 were found more commonly associated with thick MSAF (52.1%) whereas only 28% of cases with thin MSAF had apgar scores less than 5.

Table 5: Apgar score At 5 Minaccording to Type of Meconium

Apgar Score 5 Min	Thick Meconium		Thin Meconium		p value
	N	%	N	%	
≤5	9	18.8%	2	1.3%	<0.001*
>5	39	81.3%	150	98.7%	
Total	48	100.0%	152	100.0%	

Note: * significant at 5% level of significance (p<0.05)

Apgar score at 5 minute were seen to be improved (>5) in both groups of thick and thin MSAF as compared to apgar scores at 1 minute.

Table 6: Neonatal Outcome According To Type of Meconium

Neonatal Outcome	Thick Meconium		Thin Meconium		p value
	N	%	N	%	
Good	40	83.3%	149	98.0%	<0.001*
Poor	8	16.7%	3	2.0%	
Total	48	100.0%	152	100.0%	

Note: * significant at 5% level of significance (p<0.05)

Neonatal outcome was comparatively more good in thin meconium (98%) as compared to thick meconium (83.3%) Neonatal morbidity was seen more commonly in thick MSAF

Table 7: Distribution of obstetric /medical complications according to type of meconium

Obstetric /Medical Complications	Thick Meconium		Thin Meconium		p value
	N	%	N	%	
Bad OBST History	0	0.0%	1	0.7%	0.287
Eclampsia	1	2.1%	0	0.0%	
Epilepsy	0	0.0%	2	1.3%	
GDM	0	0.0%	1	0.7%	
Gestational Hypertension	1	2.1%	4	2.6%	
Thyroid Disorder	1	2.1%	0	0.0%	
Previous LSCS	5	10.4%	11	7.2%	
Prolonged Pregnancy	1	2.1%	1	0.7%	
Prom	0	0.0%	1	0.7%	
Severe Preeclampsia	1	2.1%	2	1.3%	

Multigravidas with previous LSCS accounted for maximum number (10.4% thick and 7.2% thin) of meconium staining of amniotic fluid in the present study.

Discussion

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 risk of developing MAS and its sequelae.5

A significant association has been reported between the consistency of meconium (thick versus thin) and abnormal fetal heart rate patterns, increased rates of caesarean section, low Apgar scores and acidic umbilical cord pH.

In the studies conducted by Debdas (78.75%) and Sheikh EM (78%) the incidence of thin meconium was 78.75% and 78% respectively [6]. In the present study the incidence of thin MSAF was 76% as compared to thick MSAF at 24%. The findings of present study are comparable to the study conducted by Debdas who quoted almost similar incidence.

The present study correlates with the study conducted by Kamala Ghokroo and Sandhu *et al*. [7, 8] as maximum number of patients belonged to age group 20-25 years. This study also correlated with study conducted by Unnisa S and Becker *et al* with incidence of MSAF slightly higher in primigravida's9,10. Mean gestational age was 39.8 weeks in the present study, which was comparable with the study conducted by Miller having mean gestation age of 39.82 weeks. Rosario in his study found mean gestational age of 39.62 weeks 11and Krebs found mean gestational age of 40.04 weeks indicating gestational age progresses towards post-datism incidence of meconium staining is high. However, in the study done by Mundhra R a slightly higher incidence of MSAF was seen in multigravida's (51.52%) [12].

In present study the 1 minute and 5-minute Apgar score were studied as measures of neonatal outcome and statistically significant number of infants with thick meconium had low Apgar scores as compared to thin group. Thick meconium as single variable appeared to be most significant factor influencing fetal outcome. The present study correlates with study conducted by Nayak *et al.* (1990) [13]. The maximum birth weight is in between 2.5 – 3.45 Kg. In the present study MSAF was most commonly noted in patients with previous LSCS. There was increased incidence of LSCS in previous LSCS cases with meconium stained amniotic fluid as trial of labour was shortened due to both condition i.e., MSAF and previous LSCS. Many babies required NICU admission for observation of respiratory distress and were observed for 24 hours and discharged from the NICU. Conditions like birth asphyxia was common complication followed by MAS, pneumonitis, septicemia required NICU stay for longer duration. Many workers noted that all cases of meconium aspiration syndrome were seen only in thick meconium group. Similarly, in present study, all cases of MAS were seen in thick meconium group. Gupta *et al.* found that birth Asphyxia was significantly high in meconium stained amniotic fluid [14]. Khatun found 12.9 % birth asphyxia cases in her study with significant increase in requirement of oropharyngeal suctioning [15]

Sasikala *et al.* reported that MSAF alone is not an indication of caesarean section, however patients with MSAF need strict supervision during labor for better perinatal outcome [16].

Literature suggests that meconium itself has potentially detrimental effects on fetal tissues and organs. It stimulates umbilical vessel constriction and causes vessel necrosis and may produce throbi leading to tissue ischemia. Meconium though is sterile but reduces the antibacterial property of amniotic fluid by altering levels of zinc and thus facilitates intra-amniotic infections. In presence of fetal stress such as hypoxia the gasping actions of the foetus may lead to aspiration of meconium into the lungs promoting lung tissue inflammation and respiratory distress [17].

Conclusion

Overall incidence of MSAF during labour in the present study is 14% Apgar• scores at one and five minutes were found to be low in thick meconium stained amniotic fluid and also increase in NICU admission rate, hence increased incidence of perinatal morbidity and mortality. Birth asphyxia was more commonly noted when amniotic fluid was thick• meconium stained. Abnormal heart rate pattern and incidence of caesarean section as mode of delivery was more associated with thick meconium. Thick meconium stained amniotic fluid is associated with increased rate of intervention, neonatal morbidity and mortality compared with thin. Meconium stained amniotic fluid per se is not an indicator for fetal distress especially thin MSAF but in correlation with non-reassuring fetal heart rate pattern it should be taken as an alarming sign for the neonatal outcome

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