

ORIGINAL ARTICLE

Perinatal Outcome in Relation to Meconium Stained Amniotic Fluid

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Abstract

Aims and Objectives: To study maternal high risk factors associated with meconium stained amniotic fluid (MSAF). To compare the fetal outcome in relation to MSAF and clear amniotic fluid. To analyze the perinatal outcome in relation to MSAF. **Methods:** This prospective case control study was undertaken in 400 patients from November 2012 to October 2013. **Results:** Mean 1 minute and 5 minute Apgar scores were 6.77 ± 1.016 and 8.225 ± 0.94 in MSAF group and 7.095 ± 0.81 and 8.46 ± 0.73 in clear AF group. Maximum babies in MSAF group (50.5%) and clear AF group (33.5%) had NICU stay of 1-3 days. There was higher neonatal mortality in meconium stained liquor (2%) compared to clear liquor group (0.5%). **Conclusion:** Thick meconium is associated with increased fetal heart rate abnormalities, increased operative interventions, low Apgar scores, increased risk of birth asphyxia, meconium aspiration syndrome and over all increased perinatal mortality.

Keywords: Perinatal outcome, Meconium stained amniotic fluid, Cardiotocography, APGAR score

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Introduction

The first intestinal discharge from fetus is meconium. It is invariably composed of water (as much as 80%), mucopolysaccharides, bilirubin, intestinal enzymes, hair and squamous cells.¹ India has the unfortunate distinction of claiming more than a quarter of the total newborn deaths in the world². One such attribute is meconium stained amniotic fluid (MSAF).

Meconium staining of the amniotic fluid (MSAF) is associated with adverse outcomes, chiefly for the baby, but also for the mother. For the baby, the adverse outcomes include increased risks of intrapartum asphyxia and fetal distress, intrapartum fetal death, low Apgar scores, increased incidence of neonatal intensive care admission, meconium aspiration syndrome and neonatal death.¹ Meconium stained amniotic fluid is considered a harbinger of fetal

compromise because of meconium with resultant deleterious effects on the neonatal lung.³ For the mother, there is an increased risk of caesarean section with its higher morbidity and mortality, and an increased risk of chorioamnionitis and puerperal sepsis.⁴ Passage of meconium in utero with staining of the amniotic fluid occurs in 12% to 16% of all deliveries.^{4,5,6} Presence of meconium below the vocal cord is known as meconium aspiration.⁷ Aspiration can occur in utero with fetal gasping or after birth with the first breaths of life.⁸ Meconium aspiration syndrome occurs in approximately 5% of infants born through meconium stained amniotic fluid.⁹ This study is an effort to ascertain whether meconium stained liquor has any correlation with high risk factors, whether it predisposes to fetal distress and to assess fetal morbidity and mortality in all cases of meconium stained

liquor. Identification of pregnant woman at risk of passage of meconium during labour would allow intensive fetal surveillance and early intervention which might lead to reduction in neonatal adverse outcome.

Materials and Methods

This prospective case control study was undertaken at department of obstetrics and gynecology of Jawaharlal Nehru Hospital and Research Centre, Bhilai (C.G) from November 2012 to October 2013. During the study period 200 cases with meconium stained amniotic fluid (study group) and 200 cases with clear amniotic fluid (control group) were selected from patients admitted for delivery. Informed consent was taken from all patients.

Following selection of cases a detailed history regarding age, gravida and parity, past obstetrical history, menstrual history, socioeconomic status, history of present pregnancy, history of medical and surgical disorders was noted from the patient's antenatal records and recorded in a printed proforma. Fetal heart rate (FHR) features were categorized as per Inherited Clinical Guideline C, London report¹⁰. Test of significance used was chi square test and test of proportion for categorical

variables and unpaired t test for continuous variables were used using SPSS 17.0 software. $p < 0.05$ was considered significant.

Results

In the study group, almost equal number of patients delivered by normal vaginal delivery (97 i.e. 48.5%) and by caesarean section (95 i.e. 47.5%). Only 8 i.e. 4% cases had assisted vaginal delivery. In the control group, more number of patients 149 i.e. 74.5% delivered by normal vaginal delivery, 44 i.e. 22% delivered by caesarean section and only 7 i.e. 3.5% had assisted vaginal delivery. There was statistical highly significant difference in patients who had normal vaginal delivery and caesarean section between meconium stained liquor and clear liquor groups.

Statistical highly significant difference in patients with normal and suspicious Cardiotocography (CTG) between meconium stained liquor and clear liquor groups was observed (Table-1). Mean APGAR score at 1 minute was 6.77 ± 1.016 in study group and 7.095 ± 0.81 in control group, which is statistically significant (Table-2).

Table 1: Correlation of Cardiotocography (CTG) in MSAF and clear AF

Pattern of CTG	Study group (n=200)		Control group (n=200)		chi square value	p value (df=1)
	Cases	%	Cases	%		
Normal	121	60.5	161	80.5	19.23	0.001
Suspicious	61	30.5	31	15.5	12.70	0.0004
Pathological	18	9	8	4	0.06	0.80
Total	200	100	200	100		

Table 2: Correlation of mean APGAR score at 1 minute in MSAF and clear AF babies

APGAR score (1 min)	Study group (n=200)				Control group (n=200)				p value
	n	Mean	SD	SE	n	Mean	SD	SE	
1-3	4	3	0	0	1	3	0	0	-
4-6	40	5.43	0.71	0.112	15	5.07	0.80	0.211	0.11
7-10	156	7.21	0.41	0.03	184	7.28	0.45	0.03	0.13
Overall	200	6.77	1.016	0.07	200	7.095	0.812	0.06	0.0004

Mean APGAR score at 5 minute was 8.225 ± 0.94 in study group and 8.46 ± 0.73 in control group, which is statistically significant (Table-3). Maximum babies in study group (101 i.e. 50.5%) and control group (67 i.e. 33.5%) had NICU stay of 1-3 days. There is statistical significant difference in NICU stay duration of

babies (< 1 day, 1-3 days) between meconium stained liquor and clear liquor groups (Table-4). 12 i.e. 6% babies in study group required ventilator support, whereas 1 i.e. 0.5% babies in control group needed it, which is statistically significant. All babies in study group who

required ventilator belonged to thick MSAF group.

There was statistically insignificant higher neonatal morbidity in meconium stained liquor (37 i.e. 18.5%) compared to clear liquor group

(23 i.e. 11.5%). There was higher neonatal mortality in meconium stained liquor (4 i.e. 2%) compared to clear liquor group (1 i.e. 0.5%) which is statistically not significant.

Table 3: Correlation of mean APGAR score at 5 minute in MSAF and clear AF babies

APGAR score (5 min)	Study group (n=200)				Control group (n=200)				p value
	n	Mean	SD	SE	n	Mean	SD	SE	
1-3	0	-	-	-	0	-	-	-	-
4-6	17	5.65	0.49	0.12	7	5.86	0.38	0.14	0.32
7-10	183	8.46	0.52	0.04	193	8.55	0.54	0.04	0.10
Overall	200	8.225	0.94	0.06	200	8.46	0.73	0.05	0.005

Table 4: Correlation of NICU stay in MSAF and clear AF babies

NICU stay (days)	Study group (n=200)		Control group (n=200)		chi square value	P value (DF=1)
	Cases	%	Cases	%		
< 1 day	83	41.5	15	7.5	62.49	0.0001
1-3days	101	50.5	67	33.5	11.86	0.0006
4-6days	9	4.5	4	2	1.98	0.16
≥7days	7	3.5	2	1	2.84	0.09
Total	200	100	88	44		

Discussion

The obstetric literature still has many unanswered questions regarding the significance of meconium in the amniotic fluid and the appropriate management protocols that should be followed when it is discovered. It is often assumed that an abnormal fetal heart rate, especially in the presence of meconium stained liquor, indicates hypoxia and acidosis, especially in the setup where facilities of cardiotocography and fetal scalp blood pH estimation are not available.

CTG in MSAF and clear AF

In the study group, 60.5% cases, 30.5% cases and 9% cases had normal, suspicious and pathological CTG respectively. In the control group, 80.5% cases, 15.5% cases and 4% cases had normal, suspicious and pathological CTG respectively. There was statistically significant difference in normal and suspicious CTG between meconium stained liquor and clear liquor group. The findings of suspicious CTG in MSAF and clear AF are similar to the findings recorded by Duhan N et al in 2010¹¹.

Mode of delivery in MSAF and clear AF

In the present study, in the study group, almost equal number of patients delivered by normal

vaginal delivery as well as by caesarean section. Only 4% cases had assisted vaginal delivery. There is statistically significant difference in patients who had normal vaginal delivery and caesarean section between meconium stained liquor and clear liquor groups. The present study is comparable with the study by Naqvi SB et al (2011)⁶. Our finding of statistical significant difference in caesarean section done in MSAF as compared to clear AF is similar to studies conducted by Sankhyan N et al¹², Kumari S et al (2012)¹³, and Chakraborty A et al (2013)¹⁴.

There was increased incidence of abnormal fetal heart rate pattern in meconium stained group cases. In such cases there is urgent need of delivery to avoid respiratory distress or meconium aspiration in baby; hence there is increased incidence operative intervention in MSAF cases. In our institute, we lack newer facilities for assessing fetal wellbeing like fetal scalp pH, umbilical cord blood pH and base level. So, we do caesarian section in most cases of thick MSAF even if patient was in latent labour. In our institute, we preferred forceps over vacuum in delivery of patients with MSAF. So, we had no patient with vacuum delivery.

Mean APGAR score

Present study is comparable with the study by Khatun HA et al.¹⁶ In our study, improvement was observed in 5-minute APGAR scores, may

be due to availability of pediatrician, timely resuscitation, tertiary care facilities. In spite of this MSAF cases had poor APGAR values than clear liquor group.

Table 3: Comparison of mean APGAR score noted by different authors

Authors	Year	APGAR score at 1 minute and 5 minute		p value
		MSAF	Clear AF	
Klufio CA et al. ¹⁵	1996	8.3±1.45	8.9±0.55	0.0000
		8.9±0.61	9.0±0.26	
Khatun HA et al. ¹⁶	2009	6.8±1.2	7.3±0.1	<0.01
		8.3±1.1	9.1±1.1	<0.05
Chakraborty A et al. ¹⁴	2013	7.65	8.11	<0.001
		8.67	9.29	
Present study	2013	6.77±1.016	7.095±0.81	0.0004
		8.225±0.94	8.46±0.73	0.005

NICU stay MSAF and clear AF group

In our institute, we routinely send all babies to NICU in MSAF group for observation. Only 44% babies in clear liquor group needed NICU admission. Maximum babies in study group (50.5%) and control group (33.5%) had NICU stay of 1-3 days. 5.6% babies in thick MSAF group had NICU stay of ≥ 7 days. Sheiner E et al. (2002)¹⁷ noted statistically significantly higher risk for neonatal intensive care unit admission among patients with thick meconium as compared to those with clear AF (p-0.006), even after adjustment for oligohydramnios and abnormal fetal heart rate patterns. Chakraborty A et al. (2013)¹⁴ found statistically significant association of prolonged NICU admission in MSAF as compared to clear AF (p- 0.001).

Ventilatory support required by babies

In our study, 12 i.e. 6% babies needed ventilatory support in MSAF group whereas 1 i.e. 0.5% babies needed ventilator support in clear AF (p-0.002). Khatun HA et al. (2009) in their study required ventilator support for babies only in MSAF group (4 i.e.5%).

Perinatal mortality in MSAF and clear AF

There is higher neonatal mortality in meconium stained liquor (4 i.e. 2%) compared to clear liquor group (1 i.e. 0.5%), which is statistically not significant. MSAF babies were associated with lower APGAR scores, more risk of birth asphyxia and meconium aspiration syndrome, more NICU admissions and hence more neonatal mortality. Present study is comparable with study by Naqvi SB et al.⁶ There were 4 early neonatal deaths in study group, 3 due to

MAS alone and 1 due to both MAS and HIE. One baby in control group died due to HIE (Baby had 3 tight loops of cord around neck). Gupta V et al. (1996)¹⁸ in their study had all deaths in thick meconium stained amniotic fluid group and were associated with severe birth asphyxia. Khatun HA et al. (2009)¹⁶ in their study had neonatal mortality in control group due to septicemia. Rajput U et al. (2013)¹⁹ in their study found that perinatal mortality was mainly associated with thick meconium and severe birth asphyxia.

Conclusion

Meconium stained amniotic fluid is a common fetal hazard in obstetrics. By thorough observation of the antepartum and intrapartum events prediction of the meconium staining of amniotic fluid can be attempted which would be of invaluable help in reducing the perinatal morbidity and mortality. The commonest risk factor associated with MSAF is postdatism. Other risk factors associated with MSAF are gestational hypertension, cord problems. Grading of meconium and availability of continuous intrapartum fetal heart rate monitoring play an important role in the management of patients with meconium stained amniotic fluid. Apart from this, mode of delivery depends upon gravida status, dilatation of cervix at detection of meconium and uterine contractions. Meconium detection to delivery interval is important in prevention of perinatal morbidity.

Maximum patients with thin meconium and normal CTG included in our study delivered

normally and had good neonatal outcome. Thin MSAF associated with non-reassuring fetal heart rate should be taken as potential danger sign for the baby. Presence of thick meconium should be viewed seriously as it may pose a potential danger for the baby. Repetitive bouts of asphyxia should be avoided as it leads to meconium aspiration.

Conflict of Interest: None declared

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