

Prospective observational study of outcome of meconium stained amniotic fluid in newborn

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Abstract

Background: The presence of meconium stained amniotic fluid (MSAF) is a serious sign of fetal compromise, which is associated with an increase in perinatal morbidity, clear amniotic fluid on the other hand is considered reassuring. A study by Mathews and Warshaw found that in 98.4% of cases with meconium stained liquor, the neonates were admitted to the neonatal intensive care units, these were delivered at 37 weeks of gestational age or later as it shows maturation of autonomic nervous system. MSAF occurs in 10% of pregnancies with most occurring at term or particularly post term. The purpose of this study was to evaluate the effect of clear liquor and meconium stained liquor on time and mode of delivery and to find out neonatal morbidity and mortality associated with meconium stained amniotic fluid.

Aim: To correlate the maternal and neonatal factors contributing to morbidly related to Meconium stained amniotic fluid.

Study Design: Descriptive observational study.

Materials and Methods:

Sample size: 940.

Inclusion criteria: All the newborn with meconium stained amniotic fluid (MSAF) delivered in our tertiary care hospital.

Exclusion criteria: the newborn with meconium stained amniotic fluid (MSAF) delivered outside our tertiary care hospital and admitted in NICU and those with major congenital anomaly.

Method: A total number of 940 babies born of Meconium stained amniotic fluid(MSAF) were included in the study and those admitted to NICU were studied in a detailed manner; history was noted, clinical examination was done; they were investigated as per proforma and followed up till the time of discharge. All patients during the study were managed according to neonatal resuscitation guideline 2017, babies with MSAF divided into vigorous and non-vigorous groups and managed accordingly.

Keywords: Meconium stained liquor, LSCS, Newborn outcome, meconium aspiration syndrome

Introduction

The presence of meconium stained amniotic fluid (MSAF) is a serious sign of fetal compromise, which is associated with an increase in perinatal morbidity, clear amniotic fluid on the other hand is considered reassuring.

In the earlier days, early amniotomy with active management of labour was done to detect meconium passed during labour. Amniotomy in labour is also commonly performed to detect meconium where heart rate is unsatisfactory^[2]. If meconium stained amniotic fluid (MSAF) is found, then continuous fetal heart rate monitoring is required for fetal well-being^[3]. Incidence of MSAF rises with gestational age. A study by Mathews and Warshaw found that in 98.4% of cases with meconium stained liquor, the neonates were admitted to the neonatal intensive care units, these were delivered at 37 weeks of gestational age or later as it shows maturation of autonomic nervous system.

Aspiration of meconium during intrauterine life may result in or contribute to meconium aspiration syndrome (MAS), representing a leading cause of perinatal death^[4]. MAS is more frequently seen in post-term pregnancy or in growth restricted fetuses. Factors such as placental insufficiency, maternal hypertension, pre-eclampsia, oligohydroamnios or maternal drug abuse (tobacco or cocaine) result in, in utero passage of meconium. Meconium stained liquor may be aspirated during delivery resulting in neonatal respiratory distress syndrome^[5]. The incidence of admission to neonatal intensive care unit with respiratory distress syndrome, meconium aspiration syndrome, neonatal asphyxia, chorio-amnionitis, fetal distress or fetal acidosis were higher in pregnancies complicated by meconium stained liquor.

MSAF occurs in 10% of pregnancies with most occurring at term or particularly post term. Prolonged labour was more common or was associated with worst outcome in meconium stained liquor^[6]. Caesarean section were performed twice as frequently in women presenting with MSAF and failure to progress, which was the indication in more than half of the cases.

The purpose of this study was to evaluate the effect of clear liquor and meconium stained liquor on time and mode of delivery and to find out neonatal morbidity and mortality associated with meconium stained amniotic fluid.

The purpose of this study was to evaluate factor affecting incidence of MSAF and to find out neonatal morbidity and mortality associated with meconium stained amniotic fluid.

Materials and Methods

Descriptive observational study was conducted in the pediatric Department at tertiary care hospital over a period of two years (August 2017 to August 2019). A total number of meconium stained amniotic fluid (MSAF) were included in the study out of 10800 live birth.

Inclusion and Exclusion criteria

Inclusion criteria included all the newborn with meconium stained amniotic fluid (MSAF) delivered in our tertiary care hospital.

Exclusion criteria were all the newborn with meconium stained amniotic fluid (MSAF) delivered outside our tertiary care hospital and admitted in NICU and those with major congenital anomaly.

Methods

A total number of 940 babies born of Meconium stained amniotic fluid(MSAF) were included in the study and those admitted to NICU were studied in a detailed manner; history was noted, clinical examination was done; they were investigated as per proforma and

followed up till the time of discharge. Also included newborn who are presented with respiratory distress soon after birth and/or x-ray chest showing evidence of aspiration pneumonia (atelectasis/hyperinflation) are considered as Meconium Aspiration Syndrome (MAS).

All patients during the study were managed according to neonatal resuscitation guideline 2017, babies with MSAF divided into vigorous and non-vigorous groups and managed accordingly ^[1].

In each and every patient with history of meconium stained amniotic fluid, APGAR was counted at 1 min & 5 min, if 5 min APGAR was < 7 then APGAR at 10 min & 20 min counted. Requiring positive pressure ventilation and suction was solely on the basis of status of the baby at the time of birth, whether vigorous or non-vigorous and then observed for development of signs and symptoms of respiratory distress and graded as per Downe's scoring system as mentioned in the table. X-ray chest after 6 Hrs of birth in each cases with increased respiratory rate.

Table 1: Downe's scoring system

Score	0	1	2
Respiratory rate/min	< 60	60-80	>80
Cyanosis	None	In room air	In 40% fio2
Retraction	None	mild	Severe
Grunting	None	Audible with stethoscope	Audible without stethoscope
Air entry	Clear	Bilaterally decreased	Barely audible

Score

1-3: Mild respiratory distress.

4-7: Moderate respiratory distress-prepare to transfer/intubate baby.

>7: Impending respiratory failure-intubate.

Babies without respiratory distress and who were vigorous at birth were shifted to mother side, breast feeding established and immunized with OPV, BCG & Hepatitis-B Vaccine.

All babies who required some form of resuscitation or who developed signs of respiratory distress were shifted to NICU and managed accordingly. Babies were observed for development of hypoxic ischemic encephalopathy as defined by Volpe. Those who developed HIE were scored according to Sarnet & Sarnet scoring system as per table.

Table 2: Sarnet and Sarnet staging for hypoxic ischemic encephalopathy

Feature	Stage 1	Stage 2	Stage 3
Consciousness	hyperalert	lethargic	Comatose
Muscle tone	normal	lethargic	Flaccid
Deep tendon reflexes	Brisk	exaggerated	Absent
Myoclonus	present	present	Absent
Sucking	normal	weak	Absent
Moro response	exaggerated	incomplete	Absent
Oculocephalic reflex	normal	Over reactive	Reduced/absent

We also observed for development of other complication like pneumothorax, septicaemia, metabolic acidosis and severe PPHN.

Result

A total of 940 babies born with history of MSAF and admitted to our hospital were studied. Incidence of MSAF is 8.7% in present study [7].

Total delivery during the study = 10800.

Total newborn with MSAF = 940.

Total NICU admission = 4308.

Total MSAF requiring NICU admission = 560 (13% of total admission).

Incidence of MSAF in present study = 8.7%.

Table 3: Comparison of gender prevalence

	MSAF	Total Delivery
Male	520 (9.03%)	5758
Female	420 (8.33%)	5042
Total	940	10800

Using chi-square test for statistical significance, p value is 0.25 which suggest that there is no significant correlation between incidence of MSAF in male and female.

According to the “New Ballard Scoring” the babies were divided into the following gestational categories.

Table 4: Comparison of gestation

Maturity	MSAF	Percentage
Preterm	42	4.5%
Full term	825	87.8%
Post term	73	7.7%
Total	940	

In the present study when maturity of the fetus and MSAF are considered together, there were 4.5% of pre-term, 87.8% were full term & 7.7% were post term.

Table 5: Association between modes of delivery

Mode of delivery	Vaginal	LSCS	Forceps	Vacuum
Normal (9860)	8039(81.5%)	2548(25.8%)	51(0.5%)	162(1.6%)
MSAF (940)	532(56.6%)	395(42.0%)	10(1.1%)	3(0.003%)

When compared between normal vaginal and LSCS, LSCS (especially done in emergency) is done more commonly in the patients with MSAF.

Table 6: Comparison of maternal risk factor (N=940)

PIH	269 (28.6%)
PROM	190(20.2%)
Oligohydramnios	118(12.5%)
Post date	73(7.7%)
APH	72(7.7%)
ECLAMPSIA	32(3.4%)
Severe anemia	8(0.01%)
Elderly primi	4(0.004%)
No risk factor	174(18.5%)
Total	940

Out of 940 babies in the study mothers of 766(81.49%) had one of the risk factors, mentioned in the chart. Of which 28.6% had PIH, 20.2% had PROM, and 12.5% had oligohydroamnios. This correlates with the findings of high risk situations with increased likelihood of in utero passage of meconium passage, which if timely intervened can decrease the incidence of morbidity and mortality among the babies [8].

Table 7: Comparison of Birth asphyxia

APGAR AT 5 Min.	Developed MAS	Not Developed MAS	MSAF
Severe birth asphyxia(1-3)	9(3.6%)	0	9
Moderate birth asphyxia(4-6)	144(57.6%)	166(24.1%)	310
Mild birth asphyxia(7-10)	97(38.8%)	524(75.9%)	621
Total	250	690	940

In present study out of 940 babies with MSAF 250 (26.6%) developed MAS. When APGAR score at 5 min and development of MAS considered, among 1 to 3 scored group 100% developed MAS, in 4 to 6 scored group 46.5%, in 7 to 10 scored group 15.6% developed MAS [9].

When grouped in to < 7 and 7 or more scored groups, < 7 scored group constituted 153 (61.2%) babies out of 250 babies with MAS. These finding indicates that incidence of MAS is significantly high in babies born through MSAF with APGAR at 5 min < 7, but score of 7 or more does not rule out chance of developing MAS because MAS starts as an intrauterine event.

Table 8: Complication of MSAF

MAS	250(26.6%)
Septicemia	153(16.3%)
HIE	84(8.9%)
HIE STAGE 1	42
HIE STAGE 2	26
HIE STAGE 3	16
Symptomatic PPHN	24(2.6%)
Pneumothorax	9(1%)

From 940 babies with MSAF, 560(59.6%) babies required NICU admission for active management. In study done by Erum Majid Shaikh *et al* out of 250 babies with MSAF 165(66%) required NICU admission. the cause for higher admission in that study may be due to higher incidence of MAS 115(46%) as compared to our study in which incidence of MAS is 250 (26.6%). Other complication include sepsis (16.3%), HIE (8.9%) and symptomatic PPHN (2.6%). And 9 patients developed pneumothorax (1%) [8].

Table 9: Oxygen Requirement

Oxygen requirement	MSAF newborn
CPAP	564(60%)
Ventilatory care	188(20%)
None	188(20%)
Total	940

Table 10: Outcome of Ventilated Patients

Survived	Expired	Total
26(13.8%)	162(86.2%)	188

In the present study out of 940 babies, total 188(20%) babies requires ventilator support due to complication of MSAF; Of all babies who required ventilator support 26(13.8%) babies survived and remaining 162 babies(86.2%) expired.

Out of 940 babies 188 babies (20%) does not required any active intervention.

Table 11: Cause of Death in MSAF

Cause of death	No. Of patients
Septicemia	122
DIC	102
MAS	74
HIE	18
PPHN	15
Pneumothorax	8

Out of 940 babies with MSAF, 146(15.5%) babies expired. Most common cause of death was sepsis 122 patients (13%), followed by DIC 102 patients (10.9%) and MAS 74 patients (7.9%). Other causes include, severe birth asphyxia with HIE (2%), PPHN (1.6%) and pneumothorax (0.09%).

Table 12: Mortality Rate in MSAF

Survived	Expired	Total
794(84.5%)	146(15.5%)	940

A total of 146 babies out of 940, died giving an overall mortality rate of 15.5% (10).

Table 13: Mortality Rate in Mas

Survived	Expired	Total
176 (70.2%)	74 (29.8%)	250

Out of 250 babies with MAS, 74(29.8%) babies expired.

Discussion

Meconium aspiration syndrome continues to be a challenge for neonatologist despite the fact that MAS has decreased in incidence, particularly in developed countries. The mortality attributed to MAS has decreased from 22-28 per 100,000 live births to 0.96 per 100,000 live births. In the present study, an attempt has been made to assess the study of MAS and neonatal outcome. In our study Out of total 10800 babies delivered in our tertiary care hospital, total number of meconium stained amniotic fluid (MSAF) babies were 940, suggesting the incidence of MSAF of 8.7%. Total no. of male were 520 (55.3%) and female were 420 (44.7%), Our study is comparable to most other studies done by Ramakishore Av *et al.*, Vineetagupta *et al.* [12] and Mehmoodshaikh *et al.* [11] who also observed the slight male predominance. Meconium stained amniotic fluid (MSAF) affects mostly full term and post term babies. Incidence of MSAF increases significantly as maturity increases. This correlates with the hypothesis that MSAF occurs only after the GIT matures strong enough for the peristalsis to occur i.e. after 37 weeks of gestational age. When compared between normal vaginal, and LSCS, presence of MSAF is more in emergency LSCS delivered babies. Out of 940 babies in the study mother of 766 babies had one of the risk factors, of which 28.6% had PIH, 20.2% had PROM and 12.5% had oligohydroamnios. 5 minute APGAR score < 7 has statistically significant association with development of MAS. In present study 60% of babies needed CPAP and 20% babies needed mechanical ventilation at the time of admission. Our

study is comparable to the studies done by Eva Gauchan *et al.* [14]. Satish D. Ashtekar *et al.* [13] found 23.03% MAS babies needed mechanical ventilation at the time of admission. Out of 940 babies with MSAF incidence of MAS is 26.6% and 16.3% of babies with MSAF developed septicemia, 8.9% of babies with MSAF developed HIE and 2.6% of babies developed symptomatic PPHN. Out of 940 babies, total 188 (20%) babies required ventilator support due to complication of MSAF, out of which 26 (13.8%) babies survived and remaining 146 babies (77.7%) expired. Out of 940 babies with MSAF, 146 babies (15.5%) expired. Most common cause of death was sepsis (33%) followed by DIC (10.9%). Other causes of death include severe birth asphyxia with HIE (2%), PPHN (1.6%) and pneumothorax (0.09%). Overall mortality rate in babies with MSAF was 15.5% out of which 50.7% was due to MAS.

Conclusion

It can be concluded that meconium stained amniotic fluid (MSAF) affects mostly full term and post term babies, maternal risk factors and LSCS delivery. A majority of babies born of MSAF can be managed with none or minimal intervention. Measures to prevent mortality and morbidity in MSAF: mother at risk should be monitored carefully with frequent Doppler USG, as soon as baby is delivered, right steps for resuscitation as per Neonatal Resuscitation Protocol should be followed. And babies indicated to be admitted in NICU should be taken care of quickly and closely monitored for signs of deterioration. Hence, the management of babies born of MSAF is a combined approach of obstetrician pediatrician. The mortality of babies born with meconium stained amniotic fluid with or without aspiration syndrome is statistically significant which suggest that timely intervention and management can prevent mortality and morbidity.

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