Section: Pediatrics

Original Research Article

IMMEDIATE OUTCOME OF NEONATES WITH MECONIUM STAINED AMNIOTIC FLUID

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Received : 30/03/2025
Received in revised form : 18/05/2025
Accepted : 06/06/2025

Keywords: Persistent pulmonary hypertension, Meconium aspiration syndrome,Apgar score, Hypoxic ischaemic encephalopathy

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DOI: 10.47009/jamp.2025.7.3.156

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (3); 800-803

ABSTRACT

Background: Meconium stained amniotic fluid (MSAF) is one of the common causes for neonatal death and perinatal morbidity. Meconium Aspiration Syndrome (MAS) has multifactorial pathophysiology which mainly includes inflammation/infection, mechanical airway obstruction, inactivation of the surfactant, activation of the inflammatory cascade etc. MSAF occurs in 10% to 15% of live births, of which about 3% to 4% of neonates develop Meconium aspiration syndrome. MAS leads to complications like air leak, persistent pulmonary hypertension (PPHN), hypoxic ischemic encephalopathy (HIE) etc. Meconium-stained amniotic fluid is also associated with increased frequency of operative delivery, birth asphyxia, neonatal sepsis and neonatal intensive care unit admissions. The present study aims to understand immediate neonatal outcome of meconium stained amniotic fluid, which helps for a timely intervention and management. **Materials and Methods:** A descriptive study conducted in a government tertiary teaching hospital in south India during a period of twelve months after the institutional review board approval, on 312 babies born with meconium stained amniotic fluid in inborn neonatal unit. Term singleton babies without congenital anomalies meeting study criteria were selected after obtaining written consent from their parents. Babies, who were given to mother side were monitored and those required admission were investigated and managed till outcome, with all the details collected by using individual proforma. Data collected was analyzed with the help of IBM SPSS software. **Result:** In the present study 64.5% of MSAF babies were born out of caesarean section. Of the total study group 15% of babies developed meconium aspiration syndrome. Babies with thicker meconium has poor Apgar score. 8.3% of MAS babies had Downe score of greater than 7 and 4% of MAS babies required ventilation. Only 5 MAS babies developed complications, most common complication encountered was PPHN. Total mortality rate in the present study group was 1.2 % (i.e. 8% of MAS babies). **Conclusion:** MSAF was a common problem in neonatal period with high caesarean section rate and high incidence of meconium aspiration. Thicker meconium, poor Apgar scores at 1 minute and 5 minutes are major risk factors for MAS. Requirement of ventilation support in immediate birth period has a poor outcome. It is a preventable morbidity and mortality when a proper antenatal monitoring and postnatal care provided, along with timely intervention when required.

INTRODUCTION

Meconium stained amniotic fluid (MSAF) is one of the common causes for neonatal death and perinatal morbidity.[1,2] Although, the incidence is on decreasing trend in the last decade due to improved fetal monitoring and timely termination of pregnancy, the situation is different in over crowded health care facilities, even if it is a tertiary care centre. Meconium begins to appear in the second trimester in utero and accumulates in the colon until birth. Skelly et al, observed that meconium passage usually occurs within 24 hours after birth.[3-6] Kimble et al, proposed that in utero meconium staining of liquor is usually associated with fetal hypoxia due to fetal asphyxia and decreased umbilical venous blood PO2.[7] MacDonald et al, explained in addition that in the presence of hypoxia, fetal diving reflex sets in, it shunts blood away from visceral circulation towards more vital organs i.e. the brain, heart and adrenal glands which in turn produces intestinal ischemia, leading to a transient period of hyper- peristalsis and relaxation of the anal sphincter tone, thus facilitating passage of meconium into the amniotic fluid.[8]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Meconium Stained Amniotic Fluid (MSAF) may result from, a) Post term fetus with rising Motilin levels and normal gastrointestinal function b) Vagal stimulation produced by cord or head compression due to fetal hypoxia c) In utero Stress/infection.[9-11] Meconium passage is rare before 34 weeks of gestation, and after 37 weeks its incidence increases with increasing gestational age.

Meconium aspiration syndrome (MAS) results from the aspiration of MSAF during gasping in intrauterine life or during the first breath, after birth. MAS has multifactorial pathophysiology mainly includes antenatal inflammation/infection, mechanical airway obstruction, inactivation of the surfactant, activation of the inflammatory cascade. MSAF occurs in 10% to 15% of live births, of which about 3% to 4% of neonates develop Meconium aspiration syndrome. MAS lead to complications like air leak diseases, persistent pulmonary hypertension (PPHN) and hypoxic ischemic encephalopathy (HIE).

Meconium-stained amniotic fluid is associated with increased frequency of operative delivery, birth asphyxia, neonatal sepsis, and neonatal intensive care unit admissions compared to clear amniotic fluid.[12] The present study is aimed to understand immediate neonatal outcome of meconium stained amniotic fluid, which helps for a timely intervention and management.

MATERIALS AND METHODS

This is a descriptive study conducted in a government medical college in south India over a period of twelve months after institutional review board approval.

Objective

Study of immediate outcome of term singleton neonates born out of meconium stained amniotic fluid. Immediate outcome is taken as, outcome till discharge.

Breech presentation and major congenital anomalies were excluded. In breech peripartum passage of meconium can happen but will not go in to amniotic fluid and aspirate.

Sample size 320 was calculated with the formula: n = z2 pq/d2, based on a previous cross sectional observational study conducted by Kamble MB et al, where the prevalence of mortality is 13.82%.[13]

Babies born in our hospital with meconium stained amniotic Fluid during study period were selected, after obtaining written consent from parents. All term singleton babies with history of meconium stained liquor meeting inclusion criteria were studied for their immediate outcome. Those babies who were vigorous at birth were given to mother side, examined during daily postnatal rounds for any respiratory distress and complications, and were admitted in inborn ICU if indicated. Babies who were non-vigorous at birth were resuscitated and admitted immediately at birth for further care.

Necessary data of selected babies regarding gestational age, mode of delivery, and other details at birth were collected using structured proforma.

All those babies who were admitted in ICU, were daily followed up with vitals monitoring and appropriate investigations. Need for resuscitative measures, oxygen supplementation and evidence of meconium aspiration syndrome and its complications were kept into account and treated accordingly. The selected cases were monitored and evaluated until discharge or till they succumbed to the disease. All the data were collected on pre-printed case proforma throughout the course of the disease.

In the proforma, general details collected includes Gestational age, gender, Birth weight, Mode of delivery, consistency of meconium, Apgar score, Downe Score if respiratory difficulty, resuscitative measures if any and its degree and chest x ray findings.

Outcome variables studied were - Length of hospital stay, Need for Oxygen therapy and mode of its delivery, Need for ventilator support and duration, Meconium Aspiration Syndrome, Persistant Pulmonary Hypertension, Air Leaks, Hypoxic Encephalopathy, Sepsis, and finally Discharge / Death.

RESULTS

A total of 312 meconium stained amniotic fluid babies were observed during the 12 months study period. Thick meconium was observed in 23.1%, moderate meconium in 57.7% and light meconium in 19.2%. Among all MSAF babies 64.5% are born out of caesarean section [Table 4]. Of the total study group 15% babies developed meconium aspiration (MAS) syndrome,84% were asymptomatic and 1% developed transient respiratory distress. Among the babies with MAS, 58% were male and 42% were female babies.

Babies with thicker meconium had poor Apgar score [Table 1]. Out of all MSAF babies 9.7 % required some form of resuscitation immediately after delivery [Table 3]. 8.4% of MAS babies had Downe score of greater than 7 and 4% of MAS babies required ventilation support. In the present study babies requiring ICU care were 15%. MAS babies with no complications were 90%. Those developed complications were 10% [Table 2], most common complication encountered in present study was PPHN. Total mortality rate in the present study group is 1.2% (ie.8% of MAS babies).

Table 1: Distribution of MSAF and MAS babies based on apgar score

Apgar Score	MSAF (n=312)	MAS(n=48)
>7	295(94.5%)	32(66.7%)
<7 at 1 minutes	13(4.16%)	12(25%)
<7 at 5 minutes	4(1.28%)	4(8.3%)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: Distribution of complications in MAS babies

Complications	Frequency(n=5)
PPHN	2(40%)
Air leak	1(20%)
HIE	1(20%)
Sepsis	1(20%)

Table 3: Requirement of resuscitation measures

Resuscitation measures	Frequency(n=312)
Not needed	283(90.7%)
Initial steps	13(4.2%)
Positive pressure ventilation	14(4.5%)
Intubation	2(0.6%)

Table 4: Mode of delivery in MSAF cases

Mode of delivery	Frequency(n=312)
Normal labour	92(29.5%)
Caesarian section	201(64.5%)
Instrumental delivery	19(6%)

DISCUSSION

In this study, meconium is analyzed based on its consistency as, thin (light), moderate, thick. Out of the total MSAF babies born, light MSAF seen in 60 (19.2%) babies, moderate MSAF in 180(57.7%) babies, thick MSAF in 72 (23.1%) babies. A higher incidence of moderate and thick meconium stained amniotic fluid was noticed. A Cross sectional study conducted by Tayade S et al, observed similar results.[14]

MSAF babies born out of caesarean delivery are 201 (64.5%), normal delivery is 92 (29.5%) and instrumental delivery are 19 (6%). A prospective observational study conducted by Mundhra R et al, also reported similar trend of increased caesarean deliveries (49.09%).[2]

Present study observed that 13 (4.16%) MSAF babies of the total study group born with Apgar score < 7 at 1 min, of those which 12 babies developed MAS. Perinatal asphyxia in MSAF is associated with more MAS. A prospective cohort study conducted by Tolu et al, observed similar association.[12] Proper resuscitation plays key role to prevent or reduce the effect of asphyxia in MSAF babies.

In current study 13 (4.2%) babies required suction and stimulation, 14 (4.5%) babies required bag and mask ventilation (BMV) at birth. A prospective study conducted by Qadir S et al, reported oropharyngeal suction was done in 32 babies (59.26%) in cases against 46 babies (18.70%) in control group; which is high requirement compared to present study.[13-15]

Out of total MSAF babies those required acute care, and got admitted in NICU are 50 (16%) babies. A study conducted over a period of 9 months in Kasturba hospital, Delhi by Bhatia et al, reported that about 64% of MSAF babies required NICU admission.[16]

Of all the MSAF babies, MAS developed in 48 (15%)babies in present study.

The reported prevalence of MAS occurs in range of 1.7 to 35.8% of MSAF babies in various studies. In a prospective study carried out for 2 years by Nath GDR et al, reported 17.6% babies had meconium stained liquor and out of these 6.5% babies had MAS.[17]

The major risk factor for MAS, is consistency of meconium. In present study, MAS reported in 22 (45.8%) babies with thick meconium, 22 (45.8%) babies with moderate meconium and 4 (8.4%) babies with light meconium. If meconium is thick, the likelihood of MAS is increased in a study be Nesa F et al,[18] as in current study. In the present study MAS developed in 28 (58%) male babies and 20 (42%) female babies.

This study observed 16 (33.4%) babies are small for gestational age (SGA). Retrospective study conducted among 52 MAS babies by Ashtekar et al, reported 32 (61.5%) babies were SGA.

In this study severity of respiratory distress of MAS babies is scored by Downes score, a score of 0-3 seen in 34 (70.8%) babies, score of 4-6 in 10 (20.8%) babies and a score of more than 6 in 4 (8.4%) babies. And also noticed that 50% of babies whose scored above 6, expired.

Complications of MAS observed in this study are PPHN, air leak, HIE and sepsis. PPHN being most common, in total MAS babies. Kamble MB et al, reported that sepsis was most common complication seen in 48.9%, followed by HIE and atelectasis in 39.4% and 22.3%of MAS babies respectively.[19,20]

In the present study mortality rate is 1% (8% of MAS babies) of total sample. Narang et al, who reported 7.7% higher than present study.[21] Joseph et al, encountered only one (0.6%) mortality which is closer to the present study.[22]

CONCLUSION

This study concludes that meconium staining of amniotic fluid is an alarm for vigilance and is a preventable cause of morbidity and mortality. Important observations are as follows;

- In MSAF babies, caesarean section rate were high.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

- Babies with thick meconium, poor Apgar scores at 1and 5minutes, high Downe's score (representing respiratory distress at birth) developed meconium aspiration syndrome and accounted for maximum mortality in this study.
- Oxygen supplementation via hood was required more than mechanical ventilation in admitted MAS babies.
- PPHN was the most common complication in the present study.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556