

## Original Research Article

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# Etiological factors, clinical profile and outcome of meconium aspiration syndrome babies

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## ABSTRACT

**Background:** Meconium staining of amniotic fluid has for long been considered to be a bad predictor of the fetal outcome because of its direct correlation of fetal distress, and increased the likelihood of inhalation of meconium, resultant deleterious effects on the neonatal lung. To evaluate etiological factors and severity of MAS in the study group.

**Methods:** This study was done in the Neonatal intensive care unit of the Department of Paediatrics, Government Mohan Kumaramangalam Medical College Hospital Salem, Tamil Nadu, India in the year 2018. Complete maternal and neonatal details were recorded in to the proforma. Delivery details, resuscitation did were also recorded.

**Results:** In present study, fetal distress was found to be the most common (42.5%) factor associated with MAS followed by PIH (21.6%) and PROM (17%). 22 (9.1%) cases were associated with Postdatism, 18 (7.5%) cases were associated with placental insufficiency. 88 babies had fetal distress (36.6%) prior to delivery. 138 babies had no fetal distress (57.5%).

**Conclusions:** MAS is known to cause severe respiratory distress and Downe's score ranging between 4-8, usually a few hours after the onset of respiratory distress. Nearly 73.3% of the cases with MAS had birth asphyxia, out of which 30% had severe birth asphyxia. This indicates that passage of meconium can occur in utero, often considered a feature of the stressed fetus. Undoubtedly aspiration had occurred before delivery in these babies.

**Keywords:** Downe's score, Fetal distress, Meconium staining, Very low birth weight

## INTRODUCTION

Meconium-stained amniotic fluid occurs in 10-15% of all time birth with raising frequency along with increase in gestational age of the fetus, where the frequency may be as high as 30% around 42 weeks of gestational age.<sup>1</sup> This corresponding to the normal and neural control of meconium passage, which is also maturation dependent. Several studies show that meconium staining is not an independent marker of fetal distress, neonatal outcome

was found to be better related to fetal heart rate patterns rather than the presence or absence of meconium.<sup>2</sup> Though meconium staining could be the result of an event which predisposes to or be a consequence of fetal compromise every such event may not be secure or prolong enough to cause fetal asphyxia. Therefore the presence of meconium in amniotic fluid per se without signs of fetal asphyxia is no longer considered a sign of fetal distress.<sup>3</sup> Meconium aspiration syndrome defined as the presence of meconium below the vocal cords was

earlier thought to occur with the infant's breath.<sup>4</sup> This concept leads to the advocacy of oral De Lee catheter suctioning and tracheal suctioning of meconium before infants first breath and was accepted as standard delivery room care of all meconium-stained infants. This standard care has recently been questioned by several reports which suggest that meconium aspiration is predominantly intrauterine and intrapartum events.<sup>5</sup>

The pathophysiologic concepts of MAS have also undergone a drastic change. It was earlier thought that the injurious effects of meconium on neonatal lungs were primarily responsible for MAS.<sup>6</sup> Several autopsy findings did not conform to this concept. Also, there was a lack of correlation between X-ray findings and clinical disease the current belief is that respiratory distress and hypoxia in utero produce pulmonary vascular disease. Hypoxia and asphyxia in utero produce pulmonary vaso-hyperreactivity which is directly related to the extent of fetal hypoxic insult.<sup>7</sup> The resultant pulmonary hypoperfusion in the asphyxiated neonate impairs the normal mechanism of clearing the meconium stained fluid from the lung.<sup>8</sup> This has been well documented by experimental studies. Presence of meconium may compound the insult by causing localized areas of pulmonary hypoxia as well as chemical pneumonitis. Superadded infection may further contribute to the injury.

The management of MAS is fraught with controversies.<sup>9</sup> Till nearly two decades ago, the urgent obstetrical intervention was considered whenever meconium was noted in the amniotic fluid as the presence of meconium was thought to be a sign of fetal distress.<sup>10</sup> The change in pathophysiologic concepts of MAS led to a change in a recommendation which is currently limited to fetal heart monitoring. Thick meconium, post-dated pregnancies, and oligohydramnios are known risk factors of MAS.<sup>11</sup>

## METHODS

Present study was done in the Neonatal intensive care unit of the Department of Paediatrics, Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu, India in the year 2018. Complete maternal and neonatal details were recorded into the proforma. Delivery details, resuscitation did were also recorded.

### Inclusion criteria

Babies born through meconium stained amniotic fluid with gestational age more than 37 weeks and delivered to mothers with no significant antenatal problems.

### Exclusion criteria

- Very low birth weight babies
- Preterm babies
- Babies with intrapartum risk for sepsis

## RESULTS

The study was undertaken to evaluate the etiological factors, clinical profile, and immediate outcome of 240 babies with Meconium aspiration syndrome (MAS). During the study there were 9299 live births. Out of 1448 cases of MSAF, 240 cases were diagnosed to have MAS. Incidence of MAS was 26 per 1000 live births per year.

**Table 1: Gestational age distribution.**

Gestational age	No. of cases (n=240)	%
37-42 weeks term	215	89.6%
>42 weeks post term	25	10.4%

Table 1 shows, In the present study full-term babies 215 formed the highest percentage (89.6%) of cases and only 25 of the babies were postterm. The mean gestational age was found to be 40 + 0.08 weeks with a minimum of 37 weeks and a maximum of 43 weeks.

**Table 2: Birth weight and mas.**

Birth weight (gms)	No. of cases (n=240)
<2500 gms	87 (36.2%)
2501-3000 gms	98 (40.8%)
3001-3500 gms	44 (18.3%)
3501-4000 gms	11 (4.6%)

Table 2 shows, the mean birth weight of babies with MAS was 2640 gms + 240 gms (minimum of 1770gms to maximum of 3600 gms) In present study 200 (83.3%) babies with MAS had thick meconium, 40 babies (16.6%) had thin meconium. This shows there is a significant increase in the occurrence of meconium aspiration syndrome with thick meconium stained amniotic fluid.

**Table 3: Etiological factors associated with mas.**

Causes	No. of cases (n=240)	%
Fetal distress	102	42.5
PIH	52	21.6
PROM	41	17.08
Postdatism	22	9.1
Placental insufficiency	18	7.5
Oligohydramnios	5	2.08

Table 3, In present study, fetal distress was found to be the most common (42.5%) factor associated with MAS followed by PIH (21.6%) and PROM 17%. 22 cases were associated with Postdatism, 18 cases were associated with placental insufficiency.

Table 4 shows the clinical findings in MAS cases at admission. Tachypnea was found to be the consistent finding in MAS which was seen in 210 (87.5%) of cases, followed by chest retractions seen in 160 (66.6%) and central cyanosis seen in 106 (44.2%) cases. Babies

presented with decreased air entry and grunting were 45 and 50 respectively. Babies presented with all symptoms were 30.

**Table 4: Clinical profile at admission in mas.**

Clinical findings	No. of cases (n=240)	%
Tachypnea	210	87.5%
Retraction	160	66.6%
Central cyanosis	106	44.2%
Grunting	50	20.08%
Air entry decreased	45	18.8%

**Table 5: Complications of mas.**

Complications	No. of cases (n=240)	%
PPHN	31	13
Air leak syndrome	5	2
Pneumonia	16	6.6
Septicemia	12	5

Table 5 shows in present study PPHN was found to be the single most common complication associated with MAS, which constitute 13% of the total cases. Of the 240 babies with MAS, 19(8%) babies developed acute respiratory failure, which was given mechanical ventilatory support and 12(5%) babies developed septicemia. Air leak syndrome was present in 5 cases that constitute 2%.

**Table 6: Mode of treatment.**

Treatment	No. of cases	%
Conservative	172	71.6
CPAP	49	20.4
Mechanical ventilation	19	8

Table 6 shows in present study the conservative line of management with oxygen, fluids, and antibiotics was done for 172 cases. 49 cases needed CPAP and only 19 required ventilatory support. Out of 240 babies, 172 babies were treated conservatively, and 7 babies were given direct ventilatory support due to the severity of MAS. In spite of conservative management and CPAP, 12 babies needed ventilatory support, 3 out of 19 babies who received mechanical ventilation survived in which 2 babies received surfactant therapy and 16 babies expired even with the mechanical ventilatory support. Out of 240 MAS cases, 16 cases expired.

## DISCUSSION

Meconium staining of amniotic fluid and subsequently leading on to MAS was more commonly seen in associated with fetal distress due to various causes, PIH and postterm pregnancies.<sup>12</sup> Incidence of these factors in the present study has been discussed with the correlation of other studies. The cause of fetal distress and neonatal

respiratory distress in association with MAS is not always clear.<sup>13</sup> A prospective study was done by Miller FC et al, who concluded that fetal distress is common in infants who develop respiratory distress after MSAF.<sup>14</sup> The decreased risk factors in this study and be explained by poor antenatal visits (63.3%) and so poor identification of risk factors in the mother at the time of pregnancy. In this study, 200(83.3%) babies with MAS had thick meconium, 40 babies (16.6%) had thin meconium. Similarly, Narang A et al, study 85% of babies with MAS had thick meconium and 15% of babies had thin meconium.<sup>15</sup> Patterson et al, study showed 88% of babies with MAS had thick meconium and 12% of babies with MAS had thin meconium. This shows that there is a significant increase in the occurrence of meconium aspiration syndrome with thick meconium and significantly reduced incidence of MAS with thin meconium because thick meconium can cause complete obstruction (atelectasis) or more commonly more to periphery causing partial obstruction (air leak). This obstructive property result in classical X-ray future of MAS. In this study 30% of babies with MAS had Apgar 0-3, 43.3% with 4-6, and 26.6% with 7-10. Birth Asphyxia does show with the occurrence of MAS. Increasing severity of Birth Asphyxia is directly related to the occurrence of MAS. It was observed that tachypnea was the consistent finding in most of the babies (87.5%) and chest retractions were seen in 66.6% of cases. When the severity of tachypnea was looked for, it was found that almost every baby had increased respiratory rate at admission, i.e. 55% of cases had a respiratory rate of 60-80 breath /min and 32.5% cases had a rate of 80-100 breath/min Peterson K et al, have demonstrated in puppies that meconium moves progressively to the periphery of lung with breathing, this is consistent with the observation that many infants with meconium aspiration are well for a few hours after birth before developing progressive respiratory distress.<sup>16,17</sup> Out of 240 babies with MAS 19 (8%) had Downe's scoring more than 7. Study by Stark GC et al, showed that Downe's the scoring of >7 carriers very poor prognosis with a mortality of 75%. Downe's scoring at the first hour of delivery can enable to predict the outcome and severity of MAS. Babies with score >7 need ventilator support. In present study conservative line of management with oxygen, fluids, and antibiotics was done for 172 cases. 49 cases needed CPAP and only 19 required mechanical ventilatory support. Out of 240 babies, 172 were treated conservatively and 7 babies were given direct ventilatory support due to the severity of MAS. Inspite of conservative management and CPAP support 12 babies needed ventilatory support, 3 out of 19 babies who received mechanical ventilation survived in which 2 babies received surfactant therapy on insure technique, and 16 babies expired even with mechanical ventilatory support.<sup>18</sup> Ting P et al, which showed a significant increase in the incidence of infection with MAS without antibiotics. Antibiotics should be given to all babies with MAS to prevent infection. Since, meconium increases the infectiveness of organisms. In

the present study, PPHN was found to be the most common complications (13%) associated with MAS, followed by acute respiratory failure (8%) and pneumonia (6.6%). Other complications like septicemia (5%) have also noted in the study. 8% of babies developed acute respiratory failure and were considered for ventilation. The median duration of ventilation was 3 days, with an interquartile ratio of 2-6 days.<sup>19</sup> In the present study, birth asphyxia (81%) was the main cause of death and, PPHN(12%) was the main complication leading to death, rest of the babies were died due to acute respiratory failure for which ventilatory care was given but could not be survived.<sup>20</sup>

## CONCLUSION

The incidence of Meconium Aspiration Syndrome was 2.6% of live births. The incidence of Meconium Aspiration Syndrome is increased in unbooked cases (63%). The incidence of MAS is increased in cases of prolonged duration of the second stage of labour. MAS is more common in term 989.6% and postterm babies. In postterm pregnancies (9.1%), early induction may help prevent MAS. The incidence of MAS is increased in thick MSAF 983.3% 0 cases. Increasing incidence of birth asphyxia is directly related to the increased incidence of MAS (73.3%). Use of antibiotics prevents the incidence of infection, pneumonia and septicemia in MAS. With regular antenatal check-up, the incidence of MAS can be reduced.

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