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STUDY OF CLINICAL PROFILE AND IMMEDIATE OUTCOME OF MECONIUM ASPIRATION SYNDROME IN NEONATES IN TERTIARY CARE CENTRE

Paediatrics

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ABSTRACT

Presence of meconium stained amniotic fluid [MSAF] is seen in 12-16% of deliveries. Meconium aspiration syndrome remains one of the most 5 common causes of neonatal respiratory distress. The overall frequency of Meconium aspiration syndromes varies between 5% to 25%. Meconium aspiration syndrome occurs in 10% of infants born with Meconium stain amniotic fluid. This study was conducted to review the clinical profile of Meconium aspiration syndrome in neonates & to see the immediate outcome of babies with Meconium Aspiration syndrome. This was descriptive observational study conducted among 300 neonates admitted to NICU during study period of 24 months at tertiary care center. Total 300 neonate with MAS were enrolled in this study. The majority of mother aged between 25-35 years & mean age of mother was 26.72±4.45 years. PPHN was the most frequent complication followed by Birth Asphyxia. There was no complications observed in 22.66%. About 8.00% of the newborns did not survive, while 92.00% discharged after recovery. Isolated birth asphyxia was the leading cause of death (41.66%), followed by ARF (20.83%). A majority (69.7%) stayed less than 10 days, while 18.7% stayed between 11-20 days, 9.3% stayed between 21-30 days, and 2.3% stayed for more than 31 days. The data reveals that younger women and first-time mothers dominate the sample, with a significant number of pregnancies reaching full term. Complications such as meconium aspiration syndrome and associated respiratory failures remain significant contributors to neonatal mortality. Strengthening maternal healthcare and neonatal support systems could lead to improved outcomes in future pregnancies.

KEYWORDS

MAS, Feto-maternal Factor, Outcome

INTRODUCTION

Presence of meconium stained amniotic fluid [MSAF] is seen in 12-16% of deliveries[1]. In utero, passage of meconium may simply represent the normal gastrointestinal maturation or it may indicate an acute or chronic hypoxic event, thereby making it a warning sign of a foetal compromise. Meconium passage is rare before 34 weeks of gestation and incidence increases steadily beyond 37 weeks of gestation.[2]

Factors such as placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios or maternal drug abuse (tobacco, cocaine) result in In utero passage of meconium[3] Infants born through meconium-stained amniotic fluid are about 100 times more likely to develop respiratory distress than those which are born through clear fluid.[4] Even in women who are at very low risk for obstetric complications, meconium-stained amniotic fluid is common and it is associated with a five-fold increase in perinatal mortality as compared with low-risk patients with clear amniotic fluid.[1]

Presence of meconium below vocal cord is known as meconium aspiration and it is seen in around 20-30 % of all infants with meconium stained amniotic fluid[5]. Aspiration can occur in utero with foetal gasping or after birth, with the first breaths of life.

Meconium aspiration syndrome (MAS) is defined as a respiratory distress that develops shortly after birth with radiographic evidence of aspiration pneumonitis and presence of meconium stained amniotic fluid[6]. MAS occurs in about 5% of deliveries with meconium-stained amniotic fluid[5] and death occurs in about 12% of infants with MAS[7].

Meconium passage in newborn is a developmentally programmed event normally occurring within the first 24 to 48 hours after birth intrauterine meconium passage in near-term or term fetuses has been associated with fetomaternal stress factor like hypoxia and infection independent of fetal maturity. Meconium passed as a maturational event is of thin consistency in most cases. Newborn with acute hypoxic events, near and after the onset of labour are more likely to pass thick meconium and to suffer meconium aspiration, interventions to clear meconium are more likely to be beneficial for newborn.

Meconium aspiration syndrome remains one of the most 5 common causes of neonatal respiratory distress. The overall frequency of Meconium aspiration syndromes varies between 5% to 25%. Meconium aspiration syndrome occurs in 10% of infants born with Meconium stain amniotic fluid. Infants born with Meconium stain amniotic fluid are 100 times more likely to develop respiratory distress compared to the counter parts born with clear amniotic fluid. Meconium aspiration syndrome occurs in 9% to 22% of live births with increasing frequency along with increase in gestational age of the fetus. In utero, meconium passage rarely occur before 32 weeks of gestation and most babies with meconium stained amniotic fluid are 37 weeks or older. The incidence of Meconium stain amniotic fluid increases with gestational age reaching as high as 30% in post term pregnancy. An increase incidence of Meconium stain amniotic fluid is noted in presence of feto–maternal stress factor such as hypoxia and infection, independent of fetal maturation. Meconium passage is a developmentally programmed post natal event because 98% of healthy new born pass meconium in first 24 to 48 hours after birth. Greater than 98% of Meconium stain amniotic fluid cases are noted in fetuses at or following 32 weeks of gestation. This study was conducted to review the clinical profile of Meconium aspiration syndrome in neonates & to see the immediate outcome of babies with Meconium Aspiration syndrome.

Methodology

This was descriptive observational study conducted among 300 neonates admitted to NICU during study period of 24 months at tertiary care center. All the neonates admitted to NICU fulfilling the criteria of Meconium aspiration syndrome were included in the study. Ethical committee approval was taken. After taking written informed consent, all neonates were enrolled. Routine investigations were carried out in the laboratory immediately after admission line Hb%, TLC, DLC and ESR, Special investigations like HRCT, Was also done wherever necessary. X Ray chest was done in about all cases after admission and X ray is repeated in some of the cases after clinical improvement and compared with x ray taken on Admission. All babies with Meconium aspiration syndrome were observed for complications and immediate outcome in terms of morbidity, duration of hospital stay and mortality was assessed and compared with severity at presentation.

Data Entry was done using Microsoft excel 2023 and analysis done

using SPSS V 16. Qualitative data was expressed in frequencies and percentages and Quantitative data in mean and standard deviation. Bar diagrams and pie chart were used to represent the data. p value of <0.05 was considered statistically significant.

RESULTS

Total 300 neonate with MAS were enrolled in this study. The majority of mother aged between 25-35 years & mean age of mother was 26.72±4.45 years. The majority of neonate belong to 37-40 weeks of gestational age. About 60% of mother underwent LSS followed by 30.6% had normal vaginal delivery. About 69.3 were primi & only 30.7 % were multipara. The highest contribution seen in association with maternal anaemia 24.00%, Oligohydromnios with 22.70%, IUGR with 13.30%, GDM (Gestational Diabetes Mellitus) with 12.70% and PIH (Pregnancy Induced Hypertension) with 12.00%. (Table 1)

Majority of neonate had birthweight 2.5-2.99 kg. About 63.7% had APGAR score >7. 20.66% baby had asphyxia. About 90 (30%) neonate needed intubation. About 48.9% required mechanical ventilation l<24 hours. (Table 2)

PPHN was the most frequent complication followed by Birth Asphyxia. There was no complications observed in 22.66%. (Fig 1) About 8.00% of the newborns did not survive, while 92.00% discharged after recovery. (Fig 2)

Isolated birth asphyxia was the leading cause of death (41.66%), followed by ARF (20.83%) followed by Septicaemia (16.66%), followed by Pulmonary haemorrhage with septicaemia (12.50%), and Pneumothorax (8.33%). A majority (69.7%) stayed less than 10 days, while 18.7% stayed between 11-20 days, 9.3% stayed between 21-30 days, and 2.3% stayed for more than 31 days. (Table 3)

Table 1: Distribution Of Neonate With MAS According To Maternal Factor

Maternal Factor		Frequency	Percentage
Age of mother	18-24	112	373
	25-29	91	30.3
	30-35	91	30.3
	>5	6	2
Gestational Age	<34	0	0
	34-36	30	10
	37-40	171	57
	41-42	54	18
	>42	45	15
Mode of delivery	LSCS	180	60
	Normal Delivery	96	30.6
	Forceps Delivery	18	6
	Vacuum	6	3.4
Parity	Primi	208	69.3
	Multi	92	30.7
Risk factors	Anaemia	72	24
	Oligohydramnios	68	22.7
	IUGR	40	13.3
	GDM	38	12.7
	PIH	36	12
Liquor	Thin	214	71.33
	Thick	86	28.67

Table 2: Distribution Of Neonate With MAS According To Maternal Factor

Neonatal factor		Frequency	Percentage
Birth Weight	105-1.99	10	3.3
	2.0-2.49	96	32
	2.5-2.99	112	37.3
	3.0-3.49	62	20.7
	3.5-4	20	6.7
APGAR Score	<7	109	36.7
	>7	191	63.7
Asphyxia in baby	Yes	62	20.66
	No	238	79.33
Intubation	LR/OT	60	20
	NICU	30	10
	No	210	70
Mechanical ventilation	<24 hours	44	48.9
	24-72 hours	22	24.4
	>72 hours	24	26.7

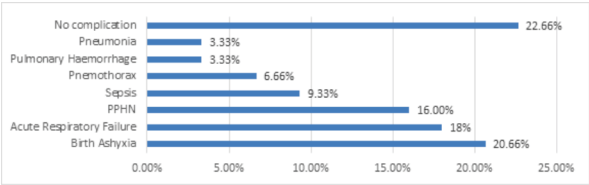

Fig 1: Complication Associated With MAS

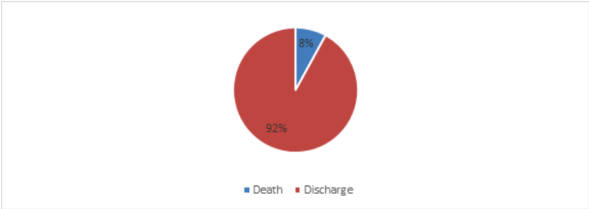

Fig 2: Outcome Of Neonate With MAS

Table 3: Distribution According To Cause Of Mortality In MAS & Hospital Stay (days)

Parameter		Frequency	Percentage
Cause of mortality in MAS	Birth Asphyxia	10	41.66
	Acute Respiratory Failure	5	20.83
	Septicaemia	4	16.66
	Pulmonary Haemorrhage	3	12.5
	Pneumothorax	2	8.33
Hospital Stay (Days)	<10	209	69.7
	11-20	56	18.7
	21-30	28	9.3
	>31	7	2.3

DISCUSSION

In the present study, the age distribution of 300 participants shows a mean age of 26.72 ± 4.45 years. The majority of the participants were between 18-24 years (37.3%). When comparing this with the study by Chaudhary SN et al[8] (2020), the maternal age was similarly distributed, with a significant number of mothers being younger. In the study by Bhagawath Babu Rao et al[9](2017) , the age distribution also showed a predominance of younger mothers, with 69% of the participants being below the age of 30. In the present study 3.30% of neonates had a birth weight between 1.5 kg to 1.99 kg, 32.00% were between 2.00 kg – 2.49 kg, and 37.3% weighed between 2.5-2.99 kg., 20.70% weighed between 3.00 3.49 kg., 6.70 weighed between 3.50-4.00kg. The mean birth weight was 2738.6 ± 590.61 grams. Birth weight is a significant predictor of neonatal outcomes, particularly in cases of MAS, where lower birth weights are associated with higher risks. In the study by Om Prakash Shukla et al[10] (2019) 63.5% of neonates had a birth weight between 2501-3500 grams, a similar percentage to the present study (55.3%). Chaudhary SN et al[8] (2020) reported similar findings. In the present study, the gestational age distribution shows that 57.00% of births occurred between 37-40 weeks. In the study done by Naveen S et al.,[11] they have conducted a study on 1500 deliveries to identify predictors of MSAF in India and they observed that a post-dated pregnancy was one of the risk factors for MSAF. Most complications related to MAS occur in full-term pregnancies, and the slight variation in percentages between the studies can be attributed to differences in sample sizes and regional factors. The findings emphasize the need for careful monitoring of term pregnancies for signs of fetal distress, which can lead to MSAF and MAS.

In the present study, 15% of the births were post-dated, with the remaining 85% occurring on time. Similar findings also found in the study by Mundhra R et al., [12], Parween S et al.,[13] & Shreshta A et al.,[14]. In the present study, 30.60% of participants delivered vaginally (NVD) & 60.00% delivered via cesarean section (CS). Chaudhary SN et al[8] (2020) found that cesarean sections were performed in 41.17% of MAS cases, a percentage slightly lower than in the present study. Their study reinforces the role of cesarean sections in mitigating the risk of MAS by providing timely intervention in cases of fetal distress. In the present study, the majority of participants had a parity of 1 (69.3%), followed by a parity of 2 or more (30.70%). This distribution highlights that most mothers were having their first child. In the study done by Parween S et al.,[80] it was observed that there was a significant difference between the parity of cases with MAS and Non MAS cases and it was thus observed that the participants with

MAS had larger proportion of primigravida when compared to the other group. Primiparity is a significant factor in these deliveries, particularly in cases involving MSAF and MAS. This suggests that first pregnancies require closer monitoring and care due to the increased likelihood of complications associated with the labor process. with 22.70%, IUGR with 13.30%, GDM (Gestational Diabetes Mellitus) with 12.70% and PIH (Pregnancy Induced Hypertension) with 12.00%. Om Prakash Shukla et al[10] (2019) also found a lower incidence of anemia, reporting that only 0.4% of mothers had anemia in their cohort of MSAF cases. In Bhagawath Babu rao et al[9] (2017) study , oligohydramnios was identified in 7% of the participants. Om Prakash Shukla et al[10] (2019) discussed IUGR in relation to fetal distress and MSAF, reporting that 23.7% of their cases had fetal distress, often linked to IUGR. While the percentage of IUGR was not explicitly stated, the condition was highlighted as a significant risk factor for MAS and other related complications, echoing the high prevalence observed in the present study. In Chaudhary SN et al[8] (2020) , the data also pointed towards PIH as a contributing factor for complications during delivery, particularly for MAS cases. While they did not provide specific percentages for PIH, it was acknowledged as a notable risk factor, consistent with the findings in the present study. In the present study, 63.70% of neonates had an APGAR score of more than 7, while 36.30% had a score less than 7. The APGAR score is a critical indicator of neonatal health immediately after birth, with lower scores often indicating the need for immediate intervention. Chaudhary SN et al[8] (2020) similarly found that low APGAR scores were predictive of worse outcomes in neonates with MAS. Although exact percentages were not given, their study confirmed the link between low APGAR scores and increased mortality in MAS cases. In a research by Parween S et al. [13], the mean APGAR score was 7.2(0.92) and considerably lower in the MAS group than in the non MSAF group. In this study, NICU was among 10% of children with MAS and 1% with newborn sepsis, which was consistent with the present study. Low APGAR scores are strongly associated with the need for immediate intervention and a higher risk of complications such as MAS, reinforcing the importance of early neonatal assessment.

In the present study, 30.00% of neonates required intubation, while 70.00% did not, 20% neonates required intubation in labour room and Operation theatre and 10% neonates required intubation in NICU. Intubation is often necessary in cases of MAS to manage severe respiratory distress and ensure adequate oxygenation. Om Prakash Shukla et al[10] (2019) reported that 19.9% of MAS cases required mechanical ventilation, which is significantly lower than the present study's intubation rate. Shukla's study emphasized that mechanical ventilation is critical for neonates with severe respiratory distress but carries an increased risk of complications and longer hospital stays.

In the present study, 69.70% of neonates stayed in the hospital for less than 10 days, 18.70% stayed for 11-20 days, 9.30% for 21-30 days, and 2.30% for over 31 days. The duration of hospital stay is often longer in cases of MAS, especially when complications like respiratory distress or sepsis arise. In the study done by Moeed A et al.,[15] the mean duration of stay was around 2 days in the ICU and this was in consonance with the present study findings. In the study done by Dargaville PA et al.,[16] they have observed that in cases with MAS there was an increased need for oxygen inhalation and because of which it indirectly led to the increased stay in the hospital. In the present study, the causes of mortality in neonates with MAS were broken down as follows: Birth Asphyxia accounted for 41.66%, Acute Respiratory Failure for 20.83%, acute respiratory failure with Septicemia 16.66%, acute respiratory Failure with Pulmonary Haemorrhage 12.50%, and ARF with Pneumothorax for 8.33%. These results highlight that both respiratory complications and infections are major contributors to mortality in MAS cases. In the present study, the neonatal death rate was 8.00%, with 24 neonates out of 300 not surviving. The results from Bhagawath Babu rao et al[9] (2017) also corroborate the findings of the present study, as their data suggested that respiratory complications such as acute respiratory failure and pulmonary hemorrhage were critical factors in neonatal mortality in MAS cases. In the study by Chaudhary SN et al[8] (2020) the neonatal mortality rate was 17% for MAS cases, which is higher than the 12% observed in the present study. In conclusion, the 12% mortality rate observed in the present study is comparable to findings in the reference studies, particularly reflecting the severe nature of MAS and its associated complications. However, the lower mortality rate compared to Choudhury's study suggests that early interventions and improved neonatal care could be contributing to better survival outcomes in the present cohort.

CONCLUSION

The study highlights several critical maternal and neonatal health issues within the population examined. The data reveals that younger women and first-time mothers dominate the sample, with a significant number of pregnancies reaching full term. Despite the overall favourable outcomes, the study identifies key areas of concern, including the prevalence of anemia, hypertensive disorders, and gestational diabetes in pregnant women. For newborns, the high rate of NICU admissions, birth asphyxia, and mortality points to the need for improved prenatal and neonatal care. Complications such as meconium aspiration syndrome and associated respiratory failures remain significant contributors to neonatal mortality. These findings underscore the importance of targeted interventions to address maternal anemia, gestational complications, and enhanced neonatal monitoring, particularly for those at risk of asphyxia and other respiratory complications. Strengthening maternal healthcare and neonatal support systems could lead to improved outcomes in future pregnancies.

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