http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v8i6.41

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Research Paper

A Study of Meconium Aspiration Syndrome and Neonatal Outcome: A Prospective Study

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Abstract

Introduction: *Meconium aspiration syndrome is one of the most common causes of respiratory distress in the newborn. Risk of passage and aspiration of meconium increases as gestational age increases. Aspirated meconium can interfere with normal breathing by several mechanisms including airway obstruction, chemical irritation, infection and surfactant inactivation and this can lead on to many complication and even death.*

Materials and Methods: *It was a hospital based prospective study conducted in a tertiary care hospital in Assam. 100 neonates who developed features of Meconium Aspiration Syndrome were included in the study.*

Results: *60% of babies showed some other complications in addition to MAS. Onset of respiratory distress in 82% of MAS babies was immediately after birth. 17 babies died and 83 were successfully discharged. Babies having low birth weight, Persistant Pulmonary Hypertension, Hypoxic Ischemic Encephalopathy, babies requiring mechanical ventilation during hospital stay and non-vigorous baby at birth are having significant risk of mortality.*

Conclusion: *MAS constitutes an important contributor to hospital based neonatal mortality. The presently reported mortality figures are much higher than international values, thus warranting the need for improved antenatal services and better ventilator management strategies.*

Introduction

Meconium aspiration syndrome (MAS) is defined as respiratory distress in a neonate born through meconium-stained amniotic fluid (MSAF) having characteristic radiological evidence of aspiration pneumonitis whose symptoms cannot be otherwise explained[1]. Meconium aspiration syndrome is one of the most common causes of respiratory distress in the newborn. MAS is a complex disorder affecting more than 4,00,000 neonates globally every year, about 10% of cases of respiratory failure in all neonates is due to MAS and is associated with significant morbidity and high mortality (up to 39%)[2].

Before 34 weeks of gestation, the passage of meconium is rare and incidence increases steadily beyond 37 weeks of gestation[3]. Risk factors for MSAF are placental insufficiency, maternal hypertension, diabetes mellitus, pre-eclampsia/ eclampsia, post term pregnancy, intrauterine growth retardation, oligohydramnios, heavy smoking, maternal drug abuse (tobacco, cocaine) result in utero passage of meconium[4,6]. Aspiration can occur in utero with fetal gasping, or after birth, with the first breaths of life[5]. The incidence

of meconium stained liquor is 10-25% of deliveries; out of which, 10% develop MAS[6].

In utero fetal breathing efforts & its strength increases with advancing gestational age. In utero, this does not cause aspiration because net amount of amniotic fluid is still in outward direction. Gasping & deep breathing lead to aspiration of meconium, which occurs with sustained hypoxia or ischemia[6]. Acute or chronic hypoxia /infection can result in the passage of meconium in utero leading to obstruction of airways, interference of gas exchange and severe respiratory distress[7,8]. Aspirated meconium can interfere with normal breathing by several mechanisms including airway obstruction, chemical irritation, infection and surfactant inactivation[9].

Considering the burden of MAS in our region and the mortality and morbidities associated with it, we decided to study its incidence, risk factors and outcome trends.

Aims and Objective

1. To evaluate the incidence of neonates developing Meconium Aspiration Syndrome.
2. To study the risk factor of meconium aspiration syndrome.
3. To study the outcome of Meconium Aspiration Syndrome.

Materials and Methods

Types of study: This is hospital based prospective study.

The study was carried out under the department of paediatrics in a tertiary care hospital in Assam. The study was carried out for a total duration of one year from July 2016 to June 2017.

Study Population: All the newborn with meconium aspiration syndrome admitted to neonatal intensive care units (NICUs). The criteria for the diagnosis of MAS (ICD-907) include:

A. History of meconium-stained amniotic fluid before delivery.
B. The presence of meconium below the vocal cords at the time of birth.
C. Evidence of respiratory distress.
D. Radiological evidence of aspiration pneumonitis

Sample Size: A total number of 100 newborns with MAS fulfilling the criteria were selected randomly for the study.

Inclusion Criteria

1) Babies with meconium stained Amniotic Fluid with Respiratory distress.
2) Babies showing features of meconium in an upper respiratory tract on direct examination or abnormal chest x ray with respiratory distress with history of MSAF.

Exclusion Criteria

1) Baby having respiratory distress due to other causes.
2) Babies with congenital abnormalities
3) Babies with multi organ dysfunction.
4) Preterm neonates.

Methods

After stabilization, physical examination in detail was done and assessed the severity of respiratory distress as per Downe's score. Investigations included sepsis screen, ABG, blood C/S, and chest x-ray was done. Echocardiography of MAS babies who had abnormal heart sound and suspected PPHN babies was done. All data collected was analysed using SPSS software. Chi-square test or Fishers exact test were used for statistical analysis. The p-value <0.05 was considered significant.

Results

Total 3992 newborns were admitted during the study period in the Neonatal Intensive Care Unit (NICU). Out of which 361 (0.9%) of them Meconium Aspiration Syndrome. Among the 361 MAS babies 100 babies were selected randomly in our study according to our inclusion and exclusion criteria. Among 100 babies 54 were male and 46 are female. Maximum MAS cases were more than 40 weeks of gestational age, 40 MAS babies were in between 37-40 weeks of gestation and 5 MAS babies were less than 37 weeks of gestation.

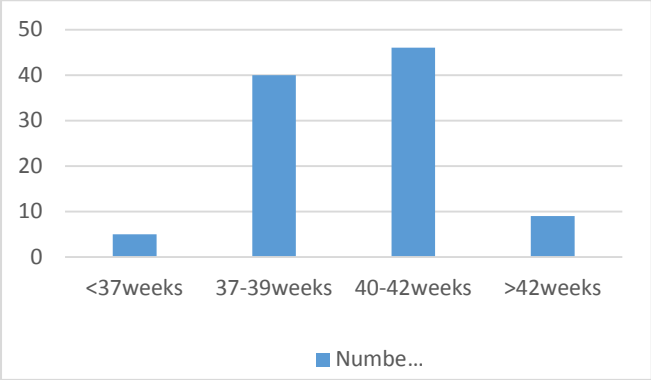

Figure 1 Relation between MAS and Gestational age

Maximum MAS babies, 64 out 100 had birth weight between 2.5 to 3.5 kg followed by 31 MAS babies had less than 2.5kg and 5 babies had weight more than 3.5kg. In this study onset of respiratory distress in 82% of MAS babies was immediately after birth. In the study at the time of admission 20 MAS babies had severe respiratory distress (Downe's score >6), 29 babies had moderate respiratory distress (Downe's score 4-6) and 51 babies had mild respiratory distress. Out of 100 babies 50% of MAS babies needed only oxygen inhalation, 21% babies needed CPAP and 29% babies needed mechanical ventilation at the time of admission.

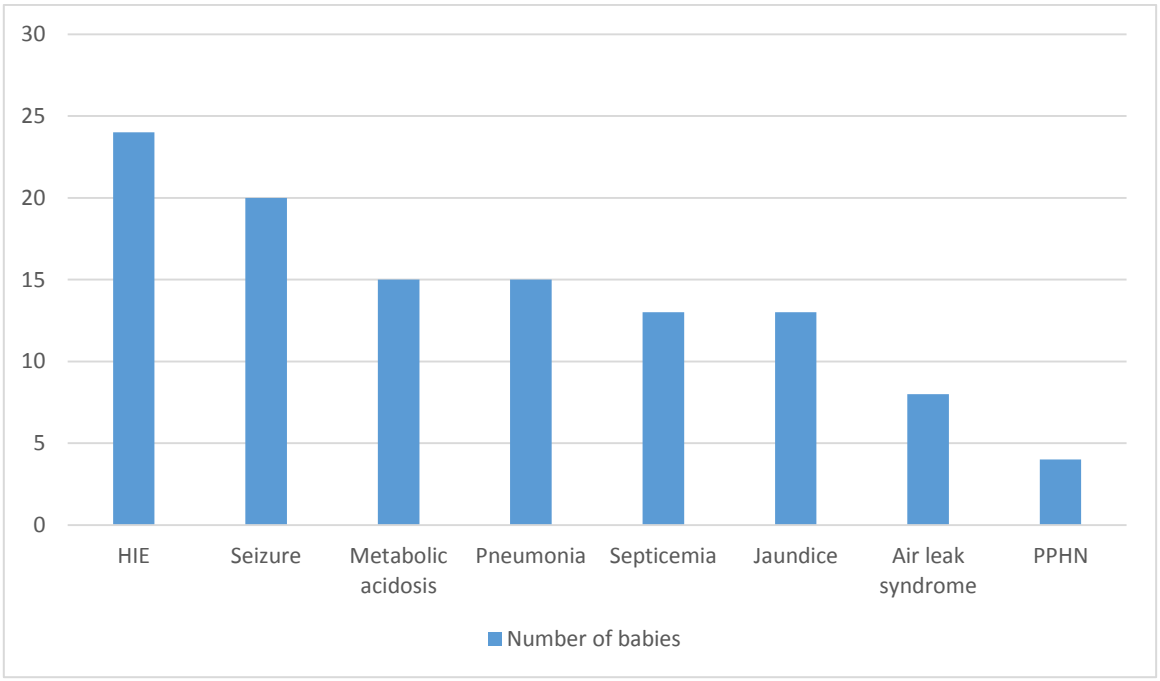

Figure: 2 Incidence of complication in MAS babies

In our study 60 out of 100 babies of MAS (60%) showed different complications (One patient may have one or more than one complications, eg. HIE with seizure and metabolic acidosis etc.). Hypoxic ischemic encephalopathy (Birth Asphyxia) was the most common complication in MAS.

Table 1 Radiographic abnormalities in MAS babies

Radiological Abnormalities	Numbers	Percentage %
Normal	23	23
Intestinal infiltrates	47	47
Hyperinflation	18	18
Pneumonia	15	15
Air leak syndrome	8	8

In our study 19 babies had normal X-ray. Abnormal X-rays was seen in 81% babies as interstitial infiltirates (47%), hyperinflation (18%), pneumonia (15%) and air leak syndrome in 8%.

Table 2 Causes of death associated with MAS babies

Cause of death	Number (total)	Percentage %
Birth asphyxia	9	52.9
Septicaemia	4	23.5
Pneumonia	3	17.6
Others	6	53.2

In the study out of 100 babies 83 babies were successfully discharged. There was death of 17 babies. The most common cause of death in MAS babies was Birth Asphyxia (52.9%). 4 babies died because of septicaemia which accounts for 23.5% of death and 3 babies died because of pneumonia which accounts for 17.6% of death. Other causes include PPHN (3 cases), pneumothorax (2 cases) and one baby died because of intraventricular haemorrhage.

Table 3 Comparison of various factors between neonates who died and survivors

Variables	Died (n=17)	Survived (n=83)	P value
Low birth weight (<2.5kg)	9 (52.94%)	22 (26.5%)	0.03
Female	10 (58.82%)	34 (40.94%)	0.17
Thick Meconium	2 (11.76%)	8 (9.63%)	0.79
Caesarean section	7 (41.17%)	38 (45.78%)	0.72
Non-vigorous at birth	10 (58.82%)	14 (16.86%)	<0.001
Need for mechanical ventilation	13 (76.47%)	16 (19.27%)	<0.001
PPHN	2 (11.76%)	2 (2.4%)	0.07
HIE	9 (52.94%)	15 (18.07%)	0.002
Sepsis	4 (23.52%)	9 (10.8%)	0.15

When comparing various factors between died and survived babies of all participants of the study it was found that low birth weight, Persistant Pulmonary Hypertension, Hypoxic Ischemic Encephalopathy, babies requiring mechanical ventilation during hospital stay and non-vigorous baby at birth are having significant risk of mortality.

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 total 4118 newborns were admitted to NICU during the study period, 9.04% (361) of them from Meconium Aspiration Syndrome Fifty four out of 100 babies in our study 54 were male and 46 were female. Our study is comparable to most other studies done by Ramakishore Av et al, Vineetagupta et al[11] and Mehmoodshaikh et al[4] who also observed the slight male predominance. In the study done by Hirenath PB et al[11] and B.M. Hanoudi et al[12] the frequency of meconium stained amniotic fluid increased with increasing gestational age of fetus. 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. In present study, birth weight of MAS babies was found to be <2.5 kg (31%), 2.5-3.5kg (66%) and >3.5 kg (5%). Our study is comparable to the study done by Hiremath PB et al[11].

In present study, Downe's score for respiratory distress at the time of admission was 0-3 (mild RD) in 51 cases (51%), score 4-6 (moderate RD) in 29 (29%) and >6 (severe RD) in 20 (20%). Our results were slightly different from the study done by Satish D. Ashtekar et al[13] which might be due to the reason that proper and strict resuscitation in labour room itself. Hence the incidence of babies with mild respiratory distress was higher in present study. In present study 50% of MAS babies needed only oxygen inhalation, 21% babies needed CPAP and 29 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.

In present study showing incidence of complications was 60 out of 83 surviving newborns. Out of 60 newborns 24 had hypoxic

ischaemic encephalopathy (birth asphyxia) (40%). Our study is comparable to the study done by Satish D. Ashtekar et al and Narang et al[13].In present study, out of 100 MAS babies, 23 babies had normal chest x-ray and others had abnormal chest x-ray finding. Among these interstitial infiltrates were present in 47 babies (47%).Our study is comparable to the study done by M.C. Espinheira et al[15] but differ in case of hyperinflation and pneumonia, probably due to higher chance of infections in our perinatal services. In present study 17 cases expired (17%) out of 100 babies. The most common cause of death among MAS babies was birth asphyxia (52.9%) followed by sepsis (23.5%), pneumonia (17.6%), PPHN (11.7%), pneumothorax (11.7%), DIC (5.8%) and intraventricular hemorrhage (5.8%).

Our study is comparable to the study done by Hiremath PB et al[11] but in their study, causes of death were birth asphyxia, septicemia and pneumonia. The discrepancy of the results of their studies was probably due to sample size variation and peripheral health care facilities. In present study, there were 17 cases expired (17%) out of 100 MAS babies. Our study is comparable to the study done by Basil Metti Hanoudi et al[12].

In the present study Low birth weight was seen in 52.94% of the neonates who died as compared to survivors where LBW was present in 26.5% of the neonates (P-value 0.03),58.82% of nonvigorous neonates at birth were seen in died group as compared to survivors where 16.86% of nonvigorous neonates were present (P-value <0.001), 76.47% MAS babies were needed mechanical ventilation at the time of admission among died group but in survivor group 19.27% babies needed ventilation (P value <0.001) and 52.95% of HIE babies were present in neonates who died as compared to survivor where18.07% of HIE babies were present (P-value 0.002). All these observations were statistically significant. A study done by Eva Gauchan et al[14] found short for gestational age and HIE significantly more in the MAS neonates who died as compared to neonates who survived

Conclusion

Meconium stained amniotic fluid is really worrisome for both obstetricians and paediatricians, as it increases the caesarean rates, causes birth asphyxia, MAS and neonatal intensive care unit admissions, which were clearly seen in this study. MAS constitutes an important contributor to hospital based neonatal mortality. The presently reported mortality figures are much higher than international values, thus warranting the need for improved antenatal services and better ventilator management strategies. Babies born non-vigorous have significantly higher mortality rates as compared to vigorous ones.

References

1. Dargaville PA, Copnell B. The epidemiology of meconium aspiration syndrome: incidence, risk factors, therapies, and outcome. Pediatrics. 2006 May 1;117(5):1712-21.
2. Vora H, Nair S. Study of meconium aspiration syndrome in neonates. GCSMC J Med Sci. 2014;3(1):64.
3. Steer PJ, Eigbe F, Lissauer TJ, Beard RW. Interrelationships among abnormal cardiotocograms in labor, meconium staining of the amniotic fluid, arterial cord blood pH, and Apgar scores. Obstetrics and gynecology. 1989 Nov;74(5):715-21.
4. Shaikh EM, Mehmood S, Shaikh MA. Neonatal outcome in meconium stained amniotic fluid-one year experience. JPMA. 2010;60(9):711-4.
5. klingner MC, Kruse J.Meconium aspiration syndrome pathophysiology and prevention. J Am Board Fam Pract. 1999;(6) 450-66.
6. Ballard, Robert A; Respiratory failure in term infant; Meconium Aspiration Pneumonia; Avery ‘s disease of New born; 8edition; 2005; chap.48;p712-714.

7. Falcigilia, Horatio S; Failure to prevent MAS ; journal of OB/GY ; March 1998
8. Suresh GK, Sarkar S. Delivery room management of infants born through thin meconium stained liquor. Indian Pediatr. 1994 Oct;31(10):1177-81.
9. Basu S, Kumar A, Bhatia BD. Role of antibiotics in meconium aspiration syndrome. Annals of tropical paediatrics. 2007 Jun 1;27(2):107-13.
10. Ramakishore AV, Subramanyam KL, Mahesh G. A study on meconium aspiration Syndrome Cases attending to Government general hospital, Anantapuramu, Andhra pradesh. Int J Res Health Sci. 2015;3(1):169-73.
11. Hiremath PB, Bahubali Gane, MeenalC , Nidhi Bansal, Ragaramya. The management practices and outcome of meconium stained amniotic fluidint J Biol Med. Res. 2012;3(3); 2204-2207.
12. Basil Metti Hanoudi 1, Adiba Mohammed Murad and Ali Duraid Ali. Meconium Staining of amniotic Fluid: A Clinical Study, British Journal of Medicine & Medical Research (3):914-921,2014.
13. Desai d et al. Int J Reprod Contracept Obstet Gynecol. 2013 Jun;2(2):190-193.
14. Eva Gauchan, Sahisnuta Banset, Tejesh Malla. Meconium Aspiration Syndrome and Neonatal Outcome: A Prospective Study . American Journal Health Research, 2015, Vol.3 No.5A, 48-52.
15. Espinheira MC, Grilo M, Rocha G, Guedes B, Guimaraes H. Meconium aspiration syndrome-the experience of a tertiary center. Revista Portuguesa de Pneumologia (English Edition). 2011 Mar 1;17(2):71-6.