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Clinical Profile and Incidence of Meconium Aspiration Syndrome, in Meconium Stained Liquor

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Abstract

Background: Meconium stained amniotic fluid (MSAF) is a common occurrence at birth and birth of non–vigorous baby born through MSAF is associated with more nicu admissions, Respiratory distress, Meconium aspiration syndrome (MAS) and various complications of MAS. Hence this study was undertaken to contribute to the existing knowledge about clinical profile of babies born through MSAF and to study various factors associated with the birth of non-vigorous babies and their final outcome. *Study Setting:* This was aprospective study, conducted in the Department of Pediatrics, MGIMS Sevagram, a rural based hospital in Central India, from June 2015 to May 2016. *Materials and Methods*: All the babies born through MSAF with singleton pregnancy and with cephalic presentation in the absence of any congenital anomalies were included in the study and history of various maternal risk factors were enquired. Babies were either grouped as vigorous or non-vigorous at birth and both the groups were followed for their final outcome. *Statistical Analysis:* The analysis was done using software used in the analysis were SPSS17.0 version and Graph Pad Prism 5.0 version. Total incidence was analyzed with respect to total meconium stained amniotic fluid deliveries. All complications were observed and outcomes of the babies was studied with respect to morbidity and mortality. Data was processed and analysis was done using chi square test. *Results:* No significant association was observed between various maternal risk factors and birth of Non vigorous babies .It was observed that birth of non- vigorous at birth was associated with development of respiratory distress, MAS and other complications associated with MAS. *Conclusion:* This study was aimed at improving the knowledge related to risk factors associated with the birth of babies with MSAF and also to study the clinical profile and final outcome of the babies born through MSAF. The information obtained can be utilised for proper management and resuscitation of non-vigorous babies at birth and also during nicu stay.

Keywords: Meconium Aspiration Syndrome; Meconium stained amniotic fluid (MSAF); Meconium Stained Liquor.

Introduction

The meconium aspiration syndrome (MAS) is defined asrespiratory distress in an infant born through meconium-stained amniotic fluid (MSAF) whose symptoms cannot be otherwise explained. This disorder may be life threatening, complicated by respiratory failure, pulmonary air leaks and persistent pulmonary hypertension.

When aspirated into the lung, either in the fetus or newly born infant, meconium may stimulate the release of cytokines and other vasoactive substances that lead to cardiovascular and inflammatory responses. The passage of meconium normally occurs within the first 24 to 48 h after birth. However, the passage of fetal meconium, resulting in MSAF, occurs in approximately 8 to 25% of all deliveries, primarily in situations of advanced fetal maturity or fetal stress.

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Most infants who are delivered with MSAF are beyond the 37 weeks of gestation and meconium rarely appears in amniotic fluid before32 weeks of gestation.

The incidence of MAS is around 20-30% of all infants with MSAF [1]. Aspiration can occur in utero with fetal gasping, or after birth with the first breaths of life.Aspirated meconium can interfere with normal breathing by several mechanisms. They include airway obstruction, chemical irritation, infection and surfactant inactivation.Aspirated into fetal lungs, meconium particles mechanically obstruct the small airways. Meconium or the chemical pneumonitis that inhibits surfactant function and inflammation of lung tissue contributes further to small airway obstruction. Auscultation reveals rales and rhonchi. These signs usually are seen immediately after birth.The respiratory manifestations include respiratory distress, tachypnea, cyanosis, and air trapping together with reduced pulmonary compliance.

Cleary and Wiswell [2] have proposed severity criteria to define MAS: 1. mild MAS is disease that requires less than 40% oxygen for less than 48 h, 2. moderate MAS is disease that requires more than 40% oxygen for more than 48 h with noair leak and 3.severe MAS is disease that requires assisted ventilation for more than 48 h and is often associated with persistent pulmonary hypertension.

The present study was under taken to note the frequency of meconium aspiration syndrome in meconium stained amniotic fluid and outcome of MAS.This study is an effort to ascertain whether meconium staining of AF has any correlation with high risk factors, and to assess exactly the fetal condition and outcome in all cases of MSAF and MAS with the help of data obtained in the present series.

Materials and Methods

This was a prospective study conducted in the NNF(National Neonatology Forum) accredited level II Special Care Neonatal Unit, Department of Pediatrics of Mahatma Gandhi Institute of Medical Sciences, Sevagram, which is a teaching hospital in rural central India. After approval from the ethics committee of the institute, this study was conducted from June 2015 to May 2016.

All babies born bysingleton pregnancy and with cephalic presentation and with no obvious fetal anomalies who have meconium stained amniotic fluid either on spontaneous rupture of membranes or on artificial rupture after taking written consent were included in the study. Exclusion criteria included multiple pregnancies, mal-presentations, fetal congenital anomalies and polyhydramnios .

All the babies born to mothers with meconium stained amniotic fluid at MGIMS, Sevagram were attended by pediatrician and babies were classified as vigorous and non-vigorous babies. Non-vigorous babies are those who have apnea or Low Respiratory rate < 40/min, bradycardia < 100/min and poor muscle tone. Vigorous babies have good respiratory effort, HR>100/min, and good muscle tone and thus were give routine care, and monitored for 48 hours at mother side. All non-vigorous babies who received initial steps of resuscitation, were given observation care at mother side and babies who needed resuscitation beyond initial steps required post resuscitation care were also admitted in level – II Special Care Neonatal Unit.Their clinical presentation, complications were observed and subjected to investigations as necessary.Total incidence was analyzed with respect to total meconium stained amniotic fluiddeliveries. All complications were observed and outcomes of the babies was studied with respect to morbidity and mortality.Data was processed and analysis was done using chi square test.

Results

Out of the total 3000 deliveries, 150 babies were born through MSAF and so the incidence was 5%. Out of these 150 babies122 were born vigorous and 28 were non vigorous .Mean maternal age for vigorous babies was 26.07±3.60 and for non-vigorous babies was 24.81±3.30 with pvalue of 0.51. In present study it was observed that53.57% of non-vigorous babies were male and 46.43% were females.

In the index study the maximum number of babies born through MSAF were full term. 91.80% of vigorous and 85.71% of non- vigorous babies were born fullterm.

The maximum number of babies in this study had birth weight of between 2.1-3 kg

The various maternal complications were compared in vigorous and non-vigorous babies and Pregnancy induced hypertension (PIH) was found to be the most common complication associated with the appearance of MSAF. Oligo-hydraminos and PIH were found to be significantly associated with birth of vigorous babies in pregnancies complicated with MSAF.

The commonest mode of delivery was caesarean section and it was significantly associated with the

birth of vigorous babies with pvalue of 0.0001.

Out of the total 28 non vigorous babies, 27 received resuscitation beyond initial steps at birth and also developed respiratory distress and only 1 baby in this group did not received resuscitation beyond initial steps and was not admitted to nicu and did not developed Respiratory distress while out of the 122 babies who were vigorous at birth 12 developed respiratory distress later and were shifted to NICU.

Severe MAS was present in 42.86% of non-vigorous babies and in only 2.46% of vigorous babies and was statistically significant

Babies with severe MAS required mechical ventilation andtotal No. of deaths in NICU among babies born with MSAF were 9.Out of which 7 babies were born non-vigorous and 2 were vigorous at birth.

The over all mortality was found to be 6% in babies

Table 1: Distribution of patients according to their gestation

Gestation	Vigorous	Non Vigorous	2-value	p-value
FT	112(91.80%)	24(85.71%)	6.64	0.036
Post FT	6(4.92%)	0(0%)		S,p<0.05
PT	4(3.28%)	4(14.29%)		
Total	122(100%)	28(100%)		

Table 2: Distribution of patients according to baby weight

Baby Wt(kg)	Vigorous	Non Vigorous	2-value	p-value
Up to 2 kg	5(4.10%)	5(17.86%)	7.21	0.027
2.1-3 kg	88(72.13%)	16(57.14%)		S,p<0.05
3.1-4 kg	29(23.77%)	7(25%)		
Total	122(100%)	28(100%)		
Mean Wt	2.71±0.47	2.52±0.57		

Table 3: Distribution of patients according to maternal complications

Maternal Complications	Vigorous	Non Vigorous	2-value	p-value
Anaemia	9(7.38%)	0(0%)	1.81	0.17,NS
PIH	14(11.48%)	1(3.57%)	3.53	0.04,S
Oligohydramnios	6(4.92%)	0(0%)	5.12	0.023,S
GDM	3(2.46%)	2(7.14%)	2.90	0.08,NS
PROM	2(1.64%)	1(3.57%)	0.68	0.40,NS
Hypothyroidism	2(1.64%)	0(0%)	2.02	0.15,NS
Hashimotos thyroiditis	1(0.82%)	0(0%)	1.00	0.31,NS
Polyhydramnios with anaemia	1(0.82%)	0(0%)	1.00	0.31,NS
Pulmonary Embolism	1(0.82%)	0(0%)	1.00	0.31,NS
Rh –ve pregnancy	1(0.82%)	0(0%)	1.00	0.31,NS
Sickle Cell Trait	1(0.82%)	0(0%)	1.00	0.31,NS

Table 4: Distribution of patients according to mode of delivery

Mode of delivery	Vigorous	Non Vigorous	2-value	p-value
Forceps	3(2.46%)	0(0%)	17.85	0.0001
LSCS	99(81.15%)	13(46.43%)		S,p<0.05
NVD	20(16.39%)	15(53.57%)		
Total	122(100%)	28(100%)		

Table 5: Distribution of patients according to RD

RD	Vigorous	Non Vigorous	2-value	p-value
Present	12(9.84%)	27(96.43%)	88.75	0.0001
Absent	110(90.16%)	1(3.57%)		S,p<0.05
Total	122(100%)	28(100%)		

Table 6: Distribution of patients according to NICU stay

NICU Stay	Vigorous	Non Vigorous	2-value	p-value
Present	12(9.84%)	27(96.43%)	88.75	0.0001
Absent	110(90.16%)	1(3.57%)		S,p<0.05
Total	122(100%)	28(100%)		

Table 7: Distribution of patients according to MAS

MAS	Vigorous	Non Vigorous	2-value	p-value
Mild	9(7.38%)	9(32.14%)	13.22	0.0001,S
Moderate	1(0.82%)	6(21.43%)	21.74	0.0001,S
Severe	3(2.46%)	12(42.86%)	41.29	0.0001,S

Table 9: Distribution of patients according to death

Death	Vigorous	Non Vigorous	2-value	p-value
Yes	2(1.64%)	7(25%)	22.03	0.0001
No	120(98.36%)	21(75%)		S,p<0.05
Total	122(100%)	28(100%)		

Table 10: Distribution of patients according to cause of death.

Cause of death	Vigorous	Non Vigorous	2-value	p-value
MAS	1(0.82%)	8(28.57%)	30.75	0.0001,S
Pneumonia	0(0%)	5(17.86%)	19.78	0.0001,S
PPHN	0(0%)	2(7.14%)	7.25	0.007,S
Septicaemia	2(1.64%)	0(0%)	2.02	0.15,NS

with meconium stained amniotic fluid i.e 9 deaths out of 150 babies.The commonest cause of death was MAS followed by Pneumonia.

Discussion

Traditionally, the passage of meconium by the fetus in uterus has been considered as a sign of fetal distress from hypoxia. Other suggests that this may represent normal physiological maturation of the fetal gastrointestinal tract.

MSAF is a common finding among the term babies and it occurred in 5% of pregnancies in this study. The importance of meconium as an obstetric risk factor is difficult to interpret when so many pregnancies demonstrate this finding.

The present study was undertaken to evaluate the incidence and significance of MAS. Among babies born with MSAF and its fetal outcome in patients admitted to MGIMS, Sevagram between June 2015 and May 2016.

Incidence of MSAF in labour widely varies as reported from time to time by different studies. In the present study the incidence was 5%.

Classification of Babies Born of MSAF were divided in to two groups, vigorous and non- vigorous based on current neonatal resuscitation guidelines [7].

Authors	year	Other Study
Kyung A Lee et.al[3]	2011	18.4%
Bharathirao et.al [4]	2011	8.45%
Khazadoost et.al[5]	2007	11.6%
Sankhyan Naveen et.al[6]	2006	15.76%
Present study	2016	5%

In the present study the vigorous babies were 122 which constituted 81% and non-vigorous babies were 28 which constituted 19% of total babies born with MSAF when compared to study done by Michel et.al [8] who reported 26% of non-vigorous babies and 74% vigorous babies.

Group	Michel etal [8],	Present study
Vigorous	74%	81%
Non Vigorous	26%	19%
Total	100%	100%

In present study higher incidence of non-vigorous babies was observed in males(53.5%) which was in accordance with study by Narli N et al (53.6%).

Most of the studies have observed postdatism [9,10,11] as being associated with MSAF but in our study most of the babies with MSAF were term babies

with gestation age between 37-40wks which is in accordance to studies by Miller et al [12], and Laxmi etagi et al [13]who have observed MSAF to be more common in term babies.

Various maternal complications like anemia, Pregnancy Induced Hypertension (PIH), oligohydramnios, Premature rupture of membranes , Gestational Diabetes Mellitus were found to be associated with occurrence of MSAF which was in accordance with studies by mundhara et al [14] who found 57.58% of cases of MSAF to be associated with high risk factors but when 2 groups were compared no high risk factor was found to be associated significantly with the birth of non-vigorous babies on the contrary PIH and oligohydramnios was found to be significantly associated with the birth of vigorous babies, this contrary finding may be due to small sample size.

Many previous studies have shown MAS to be more common in babies born by cesarean section [15, 16, 17] while others have found association of MAS with vaginal delivery [18, 19, and 20] but in our study we found no significant association between mode of delivery and birth of non- vigorous babies. On the contrary birth of vigorous babies was found to be significantly associated with cesarean section.

In the index study 9.84% of the vigorous babies developed respiratory distress and out of which 83.3% had mild to moderate MAS and only 1 baby developed severe MAS which required ventil at [21] who have observed only mild to moderate MAS in vigorous babies born through MSAF. The occurrence of respiratory distress and Severe MAS was found to be significantly associated with the birth of non-vigorous babies. (pvalue<0.05)

In the present study the overall nicu admissions were 26% among babies born through MSAF and overall mortality was 6%, both the nicu admissions and mortality was more in babies who were non-vigorous at birth as compared to vigorous babies.

Conclusion

MSAF is worrisome both for the obstetrician and the Pediatrician. The incidence of MSAF was 5%in the present study. No significant association was observed between various maternal risk factors and birth of non-vigorous babies. However respiratory distress, nicu stay, occurrence of MAS, and increased mortality was significantly associated with the birth of non-vigorous babies and thus proper resuscitation and management of babies who are born non-vigorous at birth can decrease a lot of morbidity and mortality among neonates born through MSAF

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