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Original Research Article

Clinical study of babies born through meconium stained amniotic fluid

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ABSTRACT

Background: Meconium stained amniotic fluid has been considered a sign of fetal distress and associated with poor fetal outcome, but others considered meconium passage by fetus is physiological phenomena and produce environmental hazards to fetus before birth. Such magnitude of different opinion was the object behind taking up of this study and aim was to find out incidence and effect of meconium in terms of morbidity and mortality.
Methods: Two hundred babies born with meconium stained amniotic fluid considering the inclusion and exclusion criteria from December 2012 to June 2013 in the Department of Paediatrics, Cheluvamba hospital attached to Mysore Medical College and Research Institute, Mysore. Fetal monitoring, mode of delivery, Apgar score, birth weight, resuscitation of baby are noted. All babies followed-up up to 1st week of neonatal life.
Results: In present study 200 babies born through meconium stained amniotic fluid was randomly selected-thin 37% and thick 63%. Major complications like birth asphyxia, meconium aspiration syndrome, early neonatal death seen in 5.5% (11 cases), morbidity in 37%, 12.5% in thin and 24.5% in thick MSAF. Causes of death were meconium aspiration syndrome in 3 cases, sepsis in 1 case, pneumonia in 1 case and birth asphyxia in 6 cases.
Conclusions: Immediate airway management, need for suction and intubation should be guided by state of newborn rather than presence of meconium. Timely diagnosis and management of meconium stained amniotic fluid may improve fetal outcome. From present study authors conclude that MSAF adversely affect fetal outcome mostly by thick meconium.

Keywords: Birth asphyxia, Meconium stained amniotic fluid, Meconium aspiration syndrome, Pneumonia

INTRODUCTION

Meconium passage remains an enigmatic condition. Teaching throughout this century has included the concept that meconium passage is a potential warning sign of fetal asphyxia. Meconium stained amniotic fluid has long been implicated as a factor influencing fetal wellbeing during intra-partum and post-partum periods. Whitridge J Williams, in 1903 observed that a characteristic sign of impending asphyxia is the escape of meconium. He attributed meconium passage to relaxation of the sphincter ani muscle induced by faulty airation of the (fetal) blood.[1] Indeed, although 12 to 22% of human labors are complicated by meconium. The risk increases with rise in gestational age. It is rarely seen before 37 weeks and occurs in more than 30% of the pregnancy which continue past 42 weeks of gestation.[2] Meconium aspiration syndrome (MAS) is noted in 7-22% of these infants, 5-33% develop respiratory symptoms and radiographic changes of meconium aspiration syndrome.[3] Up to 30-50% required mechanical ventilation, 20% develop pulmonary air leaks, 56% perinatal asphyxia and gastrointestinal pathology in 30.5%.[4,5] Approximately 5% of survivors require oxygenation at age 1 month.[6]

Intrapartum suctioning to remove meconium from oropharynx and trachea has not been associated with decrease in prevalence rate and severity of MAS.[7]

Passage of meconium in the mature fetus is facilitated by myelination of nerve fibers and increase in parasympathetic tone and increase in the concentration of motilil.[8,9]

Causes of meconium stained amniotic fluid:[10]

1. Physiologic maturation event
2. Acute hypoxia
3. Chronic intrauterine hypoxia.

Meconium passed as a maturational event is of thin consistency in most cases. Meconium aspiration syndrome and other serious complications occur infrequently in these circumstances.[11]

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 these newborn. Aspiration of meconium with the first breaths after birth is more likely, and the newborns are at higher risk for the obstructive and local inflammatory effects of meconium.[12]

Meconium aspiration remains the most significant cause of morbidity and mortality during neonatal period. Between 10 and 30% of meconium stained babies develop varying degrees of respiratory difficulties.[13]

Newborn who suffers chronic intrauterine hypoxia are more likely to develop pulmonary arterial muscularization and persistent pulmonary hypertension of the newborn and subsequently their responses are more depressed at birth. Chronic hypoxia and hypercapnia stimulate both meconium passage and neonatal gasping.

In such cases, meconium aspiration can occur long before birth. Complications could be due to either the aspiration of meconium, the conditions causing chronic hypoxia. Efforts to clear meconium from the newborns pharynx and trachea will be ineffective in preventing the effects of meconium aspiration in some cases. These infants are more likely to suffer from long term respiratory and neurologic complications.[14]

Many maternal factors contribute to passage of meconium before birth which include maternal age, prolonged gestation, type of labour, anemia, hypertension and toxemia of pregnancy.[15]

Miller et al in 1975 reported that presence of meconium in the AF without signs of fetal asphyxia (late decelerations and acidosis) is not a sign of fetal distress and need not be an indication for active intervention. The combination of fetal asphyxia and meconium staining of the amniotic fluid however does enhance the potential for meconium aspiration and a poor neonatal outcome.[16]

The primary concern regarding meconium stained amniotic fluid has been subjected to extensive studies and are directed at two major issues:

1. Significance of meconium as a sign of fetal distress or hypoxia.
2. Prevention of short and long term sequel such as meconium aspiration syndrome and meconium pneumonitis.

METHODS

Neonates born through MSAF at Cheluvamba Hospital, attached to Mysore Medical College, Mysore, and outborn babies referred to us with the history of MSAF.

The study period was from December 2012 to May 2014. During the study period 200 newborn babies born with the history of MSAF were randomly selected. For uniformity of results babies with major congenital anamolies, visceral/multiorgan dysfunction, born of breech or other abnormal presentation were excluded from the study.

Study conducted in Obstetric Department and NICU at present hospital. Proforma was used to collect data. All inborn deliveries were attended by paediatric resident on call.

Data was processed and analysis done.

Inclusion criteria

- Inborn babies with meconium stained amniotic fluid.
- Outborn babies with meconium staining of skin and umbilical cord.
- Babies showing features of meconium in the upper respiratory tract on examination.

Exclusion criteria

- Babies with congenital anomalies.
- Babies with visceral/multiorgan dysfunction.
- Babies born of breech or other abnormal presentation.

Statistical analysis

Collected data was entered in MS-Excel 2007 and corrected for typographic errors and analysed using SPSS 16.0 version. The comparison of qualitative data was done using chi-square test

Two hundred babies in a 1½ year period. All meconium stained deliveries attended by paediatric resident. Well babies, who had no other risk factors were roomed in with mother and followed up till discharge.

Gestational age determined using modified Ballard's score. Babies with respiratory distress were admitted in NICU. In addition, sick new borns with risk factors like HIE, LBW were also admitted. All symptomatic babies with respiratory distress who were admitted to NICU were managed with intravenous fluid, chest X-rays, routine investigations. Once babies were stable, feeds were started and discharged.

RESULTS

The presence of MSAF during labour in cephalic presentation is a potentially ominous sign of fetal wellbeing. Out of 200 cases, 113 (56.5%) mothers were registered and the rest 87 (43.5%) were not registered.

Table 1: Registration of pregnancy.

Registration	Present study
Booked	113 (56.5%)
Unbooked	87 (43.5%)

Thus, showing that registration of pregnancy is independent of meconium staining as meconium staining is a complication which occurs mostly during the course of labour.

Table 2: Comparison of mode of delivery.

Study	Results			
	NVD	LSCS	Assisted	
			Vacuum	Forceps
Sankhyan et al[17]	39%	49%	4%	6.1%
Narli N et al[18]	44.2%	55.8%	-	-
Present study	95 (47.5%)	96 (48%)	3 (1.5%)	6 (3%)

In present study 95 babies (47.5%) were born through NVD and 96 babies (48%) through LSCS as compared to Sankhyan et al where NVD was 39% and LSCS was 49%.[17] Narli N et al study where NVD was 44.2% and LSCS was 55.8%.[18]

Table 3: Correlation of gestational age in meconium stained group.

Gestational age group in weeks	Meconium stained group		
	Number of cases	Percentage	Mean gestational age in weeks
<37 weeks	01	0.5	-
37-42 weeks	197	98.5	39.82

The table shows that 98.5% of the cases are term babies. And 3.5% of babies were postdated. Mean gestational age in meconium stained group was also higher (39.82 weeks).

Table 4: Birth weight distribution.

Birth weight (g)	Number of cases	Percentage
<1500	0	0
1500-2000	12	6
2000-2500	64	32
2500-3000	75	37.5
3000-3500	44	22
>3500	5	2.5

The weight distribution of meconium stained neonates in this study was 96 (38.4%) babies weighed ≤2500g while 154 (61.6%) >2500g.

Table 5: Comparison of MAS.

Studies	Incidence
Sankhyan and colleagues[17]	10.5%
Narli N and colleagues[18]	2-6%
Present study	11%

In present study 11% of babies had MAS as compared to Sankhyan study where it was 10.5%.[17] And Narli N study where it was 2-6%.[18]

Table 6: Frequency of different group of meconium stained cases (clinical grading).

Clinical gradation	Number of cases	Percentage
Grade-I (thin)	74	37
Grade-II (thick)	126	63

Among the cases of meconium staining of AF, thin meconium constituted 37% of cases and thick meconium in 63% cases. Maximum number of cases was thick meconium stained.

Table 7: Reasons for admission to NICU.

Reasons	Number of cases	Percentage
Asphyxia	30	37.5
MAS	22	27.5
Respiratory distress	4	5
For observation	10	12.5
PPHN	2	2.5
Pneumothorax	4	5
Sepsis	10	12.5
Physiological jaundice	4	5
Total	80	100

This study had 80 babies born through MSAF admitted in NICU for various reasons. But HIE was found to be the major complication in 30 (37.5%) of NICU admitted babies. When the occurrence of HIE in babies with MSAF was compared with those without MSAF, it has been found that the incidence of HIE in babies with MSAF was higher (37.5%) than without MSAF admitted to the NICU.

The need for admission to NICU was much more in asphyxiated babies, making about 37.5%. Out of these babies with asphyxia 18 had seizures and 12 were in HIE stage III of Sarnat and Sarnat staging of HIE, 27.5% diagnosed as MAS according to the definition in the present study, 5% for respiratory distress and the remaining 12.5 % for observation, 12.5% for sepsis, 5% for pneumothorax and 5% for physiological jaundice and 2.5% for PPHN.

Table 8: Frequency of NICU care needed by neonates and staying in days.

NICU stay in days	Frequency
1-3	10
4-6	32
≥ 7	38
Total	80

The table shows that 80 cases of study group required NICU care of which ≥7 days NICU was required by 38 cases of MSG.

Table 9: Causes of death in babies with MSAF.

Causes of death	Number of cases
HIE	4
MAS +HIE	2
MAS	2
Sepsis	1
Still birth	2

Out of the 80 babies admitted to NICU, 9 (11.2%) did not survive. The major cause being HIE Stage III which consists about 4 babies, MAS 3 babies, 1 with pneumonia, and another with sepsis.

Table 10: Fetal outcome in meconium stained group.

Fetal outcome	Study group (N=200)			
	Thin group	Thick group	Total	Percentage
Neonatal morbidity	14	56	70	35
Still birth	-	2	2	1
Early neonatal death	-	9	9	4.5

DISCUSSION

Incidence

Traditionally, the passage of meconium by the fetus in utero has been considered as a sign of fetal distress from hypoxia. Others suggest, that this may represent normal physiological maturation of the fetal gastro intestinal tract. MSAF is a common finding among term births and it occurred in 8-15% 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, yet so few have adverse perinatal outcomes.

Risk factors

Some conditions associated with MSAF are intrauterine growth retardation, oligohydramnios, post-datism, maternal age, parity, hypertensive disease, prolonged rupture of membrane. In present study, the variables like prolonged rupture of membrane and PIH were useful markers for MSAF. Other maternal complications were not associated with adverse risks. Finally, in present study, post-term pregnancies were not significantly associated with MSAF.

Mode of delivery

MSAF alone is not an indicator for LSCS unless there is associated fetal distress (FD). In this study LSCS and normal vaginal delivery (NVD) were almost equal, assisted instrumental deliveries which include vacuum and forceps application. The number of LSCS born babies were 96 (48%), NVD 95 (47.5%) and instrumental 9 (4.5%). This was compared with similar studies by Nayak observed that incidence of operative delivery was more in thick MSAF group with CS rate 16.9% and 8% in this MSAF.[19]

The incidence of delivery by cesarean increased with meconium from 7% to 14% in studies by Nathan et al. and Ziadeh et al.[20] However, it did provoke considerable obstetric anxiety regarding status of fetal health leading to the finding of interventions in labour with MSAF by cesarean section and instrumental deliveries.

MAS

Out of 200 babies born through MSAF, 22 of them developed MAS satisfying the definition of MAS in the present study and comparison was done with similar studies. Meconium aspiration syndrome occurred in 11% of the babies born through MSAF. The presence of meconium found below the vocal cords increases the incidence. These infants were more likely to be apneic at birth suggesting the occurrence of intrauterine hypoxia.

Narang reported that incidence of MAS (MAS) as 10.5% those accounting for almost 20% of perinatal death MAS is a common cause of respiratory distress, in new born infants, around the world.[21] Meconium act as an irritant and cause chemical pneumonitis and acts as a good culture medium for bacteria and promote lung infection.

It destroys the surfactant causing alveolar instability, collapse and atelectasis. In small bronchioles, air trapping cause emphysema, air leaks, pneumothorax, meconium damage of fetus therefore starts in utero because aspiration may occur in utero and continues after birth.

Sex and weight

Our study shows a male predominance sex wise in MSAF. The majority of babies falling in weight group 2.5-3kg.

Outcome

MSAF is looked upon with lot of concern and a pediatrician attends the delivery complicated by MSAF. Inspite of this, babies are admitted with MAS to special care nurseries and in present study 40% were admitted. Out of 200, 5.5% was the mortality rate. MAS is the most common cause of neonatal morbidity and mortality among term infants. present study shows HIE caused due to MSAF to be a major cause of mortality.

Table 11: Fetal outcome recorded by other authors.

Fetal outcome	Gokhroo et al[22]	Present study
Morbidity	32.6%	35%
Mortality	6%	5.5%

In the present study, mortality and morbidity in MSAF is comparable to other study as observed by Usha, where morbidity was 32.6% and mortality 6% in comparison with the present study it was 35% and 5.5% respectively.[22]

MSAF with perinatal mortality

In the present study, perinatal death was 5.5% in the study group. In the series of other authors perinatal mortality ranged from 3% to 7.7%. They had similar observation as compared to present study. In present study, 100% of the perinatal mortality was in thick meconium group.

Table 12: Observation by different studies of perinatal death in MSAF case.

Studies	Perinatal mortality
Debdas et al [23]	3%
Hellman et al [24]	7%
Goud et al[25]	7.7%
Present study	5.5%

Debdas opined that in the group with thin meconium the babies are not generally depressed at birth and do not have any higher perinatal mortality rate in comparison to those with clear group.[23]

CONCLUSION

The study was conducted from December 2012 to May 2014 in Mysore Medical College and Research Institute, Mysore. During this period, 200 babies born through meconium stained amniotic fluid was randomly selected. Primiparity, prolonged labour, PIH, PROM were the common maternal problems present in mothers who had meconium staining. Fetal distress was present in 5.5% of patients with MSAF. There was not much difference in the mode of delivery in this group of MSAF and when compared to those born out of clear liquor. Incidence of MAS was 11%. The study showed that majority of the babies fall in the weight group of 2500-3000g. The ratio of Male:Female 1.5:1. It shows a male predominance in MSAF. Incidence of primigravida mothers are seen more as compared to multigravidas who present with meconium staining during the course of labour. Majority of the women fall in age group 21-30 years. The present study shows registered cases having more incidence of MSAF. The incidence of HIE was 15% which was also a main cause of NICU admission and mortality. The mortality of NICU admission was 9 and still birth 2. The complications of MSAF were HIE, MAS, Sepsis, Pneumothorax and PPHN.

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