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Original Research Article

Clinical profile of babies with meconium stained amniotic fluid

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ABSTRACT

Background: Meconium staining of amniotic fluid (MSAF) is a relatively common problem occuring in 10-25% of all deliveries. Meconium aspiration syndrome is more common in term babies than in preterm babies with rising frequency along with increase in gestational age of the fetus. Meconium stained amniotic fluid generally indicates sign of fetal distress. The objective of this study was to study clinical profile of meconium aspiration syndrome and the probable risk factors for meconium aspiration syndrome.
Methods: It is a prospective observational sectional study conducted in NICU of department of paediatrics of tertiary care centre from 1st January 2015 to 30th June 2016.
Results: In this study both sexes were equally affected, majority of the neonates were above 2.5kg and only very few (2 neonates) were less than 1.5kg. majority of the neonates were full term, it was found that there is a significant association between thick MSAF and the development of MAS, it was found that there is a significant association between low APGAR score at 1 minutes and the development of MAS, there is a strong association between thick MSAF and mortality in MSAF babies. Anemia 38 (25%) was the most frequent perinatal risk factor followed by fetal distress 27 (18) and PIH 21 (14%).
Conclusions: Newborns with thick MSAF were more likely to develop MAS and thick MSAF and low APGAR at 1 min were associated with high risk of development of MAS. Passage of thick meconium was significantly associated with severe birth asphyxia and carried a bad prognosis with increased risk of development of meconium aspiration syndrome and hypoxic ischaemic encephalopathy.

Keywords: APGAR score, Meconium stained amniotic fluid (MSAF), Meconium aspiration syndrome (MAS), Thick MSAF

INTRODUCTION

Meconium staining of amniotic fluid (MSAF) is a relatively common problem occuring in 10-25% of all deliveries.[1] The most important concern with MSAF is its association with fetal distress and adverse perinatal outcome.

Meconium is the first intestinal discharge of a newborn which is composed of intestinal secretions such as bile, desquamated skin, lanugo, mucus and intestinal epithelial cells; which is greenish, thick and viscous formed during the 3rd week of intrauterine life.[2] Intestinal secretions, mucosal cells and solid elements of swallowed amniotic fluid are the three major solid constituents of meconium. Water is the major liquid component, making upto 85-95% of meconium.

Intrauterine distress cause relaxation of anal sphincter leading to the passage of meconium into the amniotic fluid. There are so many predisposing risk factors that

promote the passage of meconium into the amniotic fluid in utero like utero-placental insufficiency, maternal hypertension, cord around neck, oligohydramnios, diabetes mellitus, heavy smoking, post term pregnancy and intra uterine growth restriction, ante-partum haemorrhage and anaemia.[3]

The incidence of MSAF is 10-12.5% of all deliveries and only 20-30% of these babies are depressed at birth.[4] About 5% of the babies born through meconium stained amniotic fluid develop meconium aspiration syndrome and the mortality rate of these babies vary from 4-7%. Meconium aspiration syndrome is more common in term babies than in preterm babies with rising frequency along with increase in gestational age of the fetus. It is rare before 34 weeks, increasing to more than 30% in pregnancies of more than 42 weeks gestation.

Meconium stained amniotic fluid is a sign of fetal distress. Due to the various predisposing risk factors, fetus may pass meconium in utero. Gasping and deep breathing predisposes to aspiration of meconium which occurs with sustained hypoxia or ischemia leading to obstruction of airways, interference of gas exchange and severe respiratory distress.

Although meconium stained amniotic fluid generally indicates sign of fetal distress, but in addition, meconium passage may be a physiological consequence of increased levels of intestinal hormone, motilin.[5]

Meconium staining of amniotic fluid along with low APGAR score has been considered to be a predictor of poor fetal outcome because of its direct correlation to fetal distress and increased likelihood of inhalation of meconium with resultant deleterious effects on neonatal lungs.[6] Meconium aspiration syndrome is not only associated with high mortality rate but it is also associated with serious sequelae in the survivors.

METHODS

This study was conducted in the NICU of Department of Paediatrics of tertiary care centre from 1st January 2015 to 30th June 2016. 152 neonates with meconium stained amniotic fluid admitted in NICU of the tertiary care hospital constituted the material of the study. It is a prospective observational study. Detailed history and clinical findings were recorded in the predesigned proforma. Procedure was explained to the parents and oral and written consent was taken. Study protocol was approved by institutional ethical committee.

A detailed history in all cases was taken with emphasis on parity, duration of labor, thick or thin meconium stained amniotic fluid, premature rupture of membranes, medical illness like anemia, pregnancy induced hypertension, oligohydramnios, mode of delivery, birth weight, assessment of gestational age, signs of fetal distress, APGAR score at 1 minutes and 5 minutes.

Thorough clinical examination was done - vitals, general physical examination and systemic examination with special reference to respiratory system. Assessment of gestational age was done using modified Ballard Scoring System. Sex of the babies were noted and anthropometric measurements were taken and accordingly neonates were classified as small for gestational age/ large for gestational age / appropriate for gestational age. Also, assessment of respiratory distress by Silverman-Anderson score and Downe's Score was done. Babies were examined for complications like Persistent Pulmonary Hypertension, Hypoxic Ischaemic encephalopathy, Pneumothorax and atelectasis. And according to severity of respiratory distress, the treatment Strategy was decided like parental antibiotics, supplemental oxygen, mechanical ventilation: invasive/non-invasive, Surfactant, continuous positive airway pressure(CPAP), intravenous fluids, etc.

Investigations were done as per needed

All neonates were managed as per the standard protocol of NICU with all aseptic care. Each neonate was followed till discharge or death and condition was noted at discharge as normal with or without sequelae. The data was collected on proforma and analysed using descriptive statistics. The statistical software namely Open epi-info was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs and tables etc. Significant association between variables were tested using Chi- square test and Fischer exact test of significance by Open epi-info and $P< 0.05$ was considered statistically significant. P values are calculated using chi square table.

RESULTS

152 neonates with meconium stained amniotic fluid admitted in NICU of the tertiary care hospital constituted the material of the study.

Table 1: The distribution of cases according to the sex (n=152).

Sex	No. of cases (n)	Percentage (%)
Male	76	50
Female	76	50
Total	152	100

In this study both sexes were equally affected.

Table 2: The distribution of cases according to the birth weight (n=152).

Weight (kg)	No. of cases (n)	Percentage (%)
≥ 2.5	112	74
1.5-2.5	38	25
≤1.5	2	1
Total	152	100

Majority of the neonates were above 2.5kg and only very few (2 neonates) were less than 1.5kg.

Table 3: The distribution of cases according to the gestation age (n=152).

Gestational age (week)	No. of cases (n)	Percentage (%)
≥ 37	150	99
30-37	2	1
28-30	0	0
Total	152	100

Majority of the neonates were full term.

Table 4: The distribution of MAS in Thick MSAF and thin MSAF.

MSAF	MAS	Asymptomatic MSAF	Total
Thick MSAF	32	5	37
Thin MSAF	35	80	115
Total	67	85	152

P-value=35.68; Chi Square=<0.001HS.

There is a significant association between thick MSAF and the development of MAS.

Table 5: The distribution of cases according to perinatal risk factors, (n=152).

Perinatal risk factors	No. of cases (n)	Percentage (%)
Cord around neck	4	3
Prolonged labour	17	11
Fetal distress	27	18
PROM	15	10
PIH	21	14
Oligohydramnios	11	7
APH	2	1
Post-Term	17	11
Anemia	38	25
Total	152	100

Among the all 152 neonates studied, anemia 38 (25%) was the most frequent perinatal risk factor followed by fetal distress 27 (18) and PIH 21 (14%).

Table 6: The distribution of MAS according to APGAR at 1 min.

APGAR at 1	MAS	Asymptomatic MSAF	Total
<7	61	12	73
>7	6	73	79
Total	67	85	152

p-value=88.83; Chi-Square=<0.001HS

There is a significant association between low APGAR score at 1 min and the development of MAS.

Table 7: The outcome of babies with thick MSAF and thin MSAF.

Nature of MSL	Discharge	Death	Total
Thick MSAF	23	14	37
Thin MSAF	115	0	115
Total	138	14	152

Chi-Sq= 47.93; P-Value = 0.001 HS

There is a strong association between thick MSAF and mortality in MSAF babies.

DISCUSSION

With a view to evaluate the morbidity, mortality and probable risk factors of meconium stained amniotic fluid, the study concluded some important facts which need to be observed in managing these cases in our hospital settings as well as in some developing countries like ours with limited resources.

Meconium stained amniotic fluid (MSAF) is present in 8-15% of all deliveries. Our data like other studies shows higher rate of MSAF in higher gestational age. It is also interesting to note that all term babies don't pass meconium in amniotic fluid. The reasons being;

- Presence of thick viscous meconium cap at the distal end of a GIT
- Pronounced peristaltic movements are unusual in foetus and
- Anal sphincter tone is greater in foetus than neonate.

Meconium stained amniotic fluid(MSAF) is unusual before 36 weeks of gestation (1.3%). This is postulated to be due to the increasing levels of intestinal hormone motilin with increasing gestational age which brings about faster intestinal movements, defecation and maturation of innervations of GIT associated with vagal stimulation. Levels of this hormone could be taken as a useful predictor of pre and/or intrapartum asphyxia in the sense that more motilin could effect more meconium passage into amniotic fluid giving rise to thick or pea-soup appearing MSAF and the resultant outcome.

Newborns with thick MSAF were more likely to develop MAS and thick MSAF and low APGAR at 1 min were associated with high risk of development of MAS. Passage of thick meconium was significantly associated with severe birth asphyxia and carried a bad prognosis with increased risk of development of meconium aspiration syndrome and hypoxic ischaemic encephalopathy.

In the present study, 1350 babies were included in the study, out of which 152 babies had meconium stained amniotic fluid. Therefore, the incidence of MSAF in the

present study is 11.26%. In a study by Ross et al, the incidence of MSAF was found to be 12% which are comparable to the present study.[7] In a study conducted in PGIMER, Chandigarh, incidence of MSAF was found to be 7.48%.[8] This low incidence was explained by the fact that in this study, majority of the newborn babies born before 33 weeks of gestation did not have meconium stained amniotic fluid.

Table 8: Comparison studies showing the effect of gestational age on meconium passage in fetus.

Authors	Total no. of cases	Gestational age (37-42 weeks)	Gestational age (>42 weeks)
Ramakishore et al[9]	50	46 (92%)	04 (8%)
Chandran et al[10]	301	250 (83%)	51 (17%)
Present Study	152	133 (87%)	17 (11%)

In the present study, the higher proportion of cases with MSAF were more than 37 weeks of gestation. The results of other studies also showed increased proportion of cases more than 37 weeks of gestation. This was related to maturity and increased levels of intestinal hormone, motilin with increasing gestational age.

Table 9: Comparison studies showing the sex distribution in MSAF.

Authors	Total no. of cases	No. of males	No. of females
Ramakishore et al[9]	50	29 (58%)	21 (42%)
Chandran et al[10]	301	155 (51%)	146 (49%)
Present study	152	76 (50%)	76 (50%)

In the present study, it was found that babies with MSAF were equally distributed in both sexes. The results of other two studies also showed that babies with MSAF were equally distributed in both sexes. This showed that sex of the babies had no association with meconium stained amniotic fluid.

Table 10: Comparison studies showing birth weight in MSAF.

Authors	Total no. of cases	<2.5Kg	2.5-4Kg
Ramakishore et al[9]	50	11 (22%)	39 (78%)
Chandran et al[10]	301	45 (15%)	256 (85%)
Present study	152	40 (26%)	112 (74%)

Table 11: Comparison study showing the distribution of risk factors in meconium stained amniotic fluid.

Major risk factors	Ramakishore et al[9] (n=50)	Chandran et al[10] (n=301)	Present study (n=152)
Anemia	11 (22%)	69 (23%)	38 (25%)
PIH	06 (12%)	38 (13%)	21 (14%)
PROM	06 (12%)	36 (12%)	15 (10%)
Prolonged labor	02 (4%)	53 (18%)	17 (11%)
Oligohydr amnois		20 (7%)	11 (7%)
APH		02 (1%)	02 (1%)
Fetal distres	14 (28%)	24 (8%)	27 (18%)
Post term	04 (8%)	51 (17%)	17 (11%)
Cord around neck	08 (16%)		04 (3%)

In the present study, higher proportion of babies were more than 2.5kg. In other two studies, it was also observed that similar results were obtained with higher proportion of babies born with MSAF were more than 2.5 kg. This was related to maturity with higher proportion of babies with MSAF were more than 37 weeks gestation (full term babies).

In the present study, anemia as a major risk factor was observed in 25% of the cases which is also similar in Chandran et al in which anemia as a major risk factor was observed in 23% of the cases. In Ramakishore et al, it was observed that Fetal distress as a major risk factor was observed in 28% of the cases followed by anemia which was 22% of the cases.[9,10]

The variations in the occurrence of perinatal risk factors probably reflect differences in the rates of occurrence of the predisposing risk factors in the various studies

CONCLUSION

Meconium aspiration syndrome is one of the leading causes of mortality and morbidity among the neonates in our country. Early recognition and prompt management of the deliveries complicated by meconium stained amniotic fluid will help in reducing the mortality and morbidity associated with meconium aspiration syndrome

- The maternal risk factors which were associated with the development of MSAF were anemia, prolonged labor, premature rupture of membranes, fetal distress, PIH, post-maturity, oligohydramnios, cord around neck and ante-partum haemorrhage
- The risk factors which were significantly associated with the development of MAS were thick MSAF and low APGAR at 1 minute.

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