Original Research Article

A study of the probable risk factors for meconium aspiration syndrome

Deepa Sachin Phirke[1], Bhavesh Shah[2*], Defairlin Ranee[3]

[1]Associate Professor, [2]Assistant Professor, [3]Resident, Department of Paediatrics Government Medical College, Miraj, Maharashtra, INDIA.
Email: dsphirke@gmail.com, shahbhavesh1010@rediffmail.com

Abstract

Background: 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. **Aims and Objectives:** To study the probable risk factors for meconium aspiration syndrome **Methodology:** This prospective study was conducted in NICU of department of Paediatrics of tertiary care centre from 1st January 2015 to 30th June 2016. Total 152 neonates meeting the inclusion and exclusion criteria constituted the material for this study. Detailed history and clinical findings were recorded in the predesigned proforma. The data was collected on proforma and analyzed 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. **Result:** It was found that there was no association between the sex of the babies and the MAS or asymptomatic MSAF. The majority of the patients were full term i.e. Gestational age (wk.) > 37 were 99%. The majority of the patients were born to Primigravida mothers (66%). 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%).It was found that there was a significant association between thick MSAF and the development of MAS (P-value=35.68, X^2=<0.001HS) **Conclusion:** It can be concluded from our study that the majority of the patients were full term i.e. Gestational age (wk.) > 37 were, born to Primi mothers and also anemia was the most frequent perinatal risk factor followed by fetal distress and PIH. It was found that there was a significant association between thick MSAF and the development of MAS

Key Words: Meconium aspiration syndrome (MAS), Risk factors of MAS, PIH (Pregnancy Induced Hypertension), Anemia in Pregnancy.

[*]**Address for Correspondence:**
Dr. Bhavesh Shah, Assistant Professor, Department of Paediatrics Government Medical College, Miraj, Maharashtra, INDIA.
Email: shahbhavesh1010@rediffmail.com
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INTRODUCTION

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 up to 85-95% of meconium. Intrauterine distress cause relaxation of anal sphincter leading to the passage of meconium into the amniotic fluid. There are 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. About 5% of the babies born through meconium stained amniotic fluid develop meconium aspiration[3]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 ischaemia leading to obstruction of airways, interference of gas exchange and severe respiratory distress. Though meconium stained amniotic fluid generally indicates sign of fetal distress, but meconium passage may be a physiological consequence of increased levels of intestinal hormone, motilin.[5] Although there is strong correlation between fetal distress and meconium stained amniotic fluid, there is also a strong independent association between meconium passage and fetal distress. A recent controversial review by Katz and Bowes,[6] however concluded that there exists no independent association between meconium passage and fetal distress. Though this study has been criticized,[1] it has focussed attention upon meconium passage being related in large part to maturational events only and not to intrauterine stress or hypoxia. Meconium[7] staining of amniotic fluid has been considered to be a predictor of poor fetal outcome because of its direct correlation to fetal[4] distress and increased likelihood of inhalation of meconium with resultant deleterious effects on neonatal lungs. Meconium aspiration syndrome is not only associated with high mortality rate but it is also associated with serious sequelaes inthe survivors. The serious complications associated with meconium aspiration syndrome include pulmonary hypertension, broncho pulmonary. dysplasia, birth asphyxia associated with meconium aspiration during delivery and the resultant developmental delay due to birth asphyxia. Due to the above mortality and morbidity associated with meconium aspiration syndrome, therefore it is necessary to identify those high risk pregnancies at high risk for meconium stained amniotic fluid so that necessary actions can be taken in time to prevent the complications associated with meconium aspiration syndrome. Due to the recent advancement in the field of neonatology and in the various treatment modalities of meconium of meconium aspiration syndrome, the mortality due to meconium aspiration syndrome can be reduced. But the best way of reducing the incidence is to prevent the occurrence of meconium stained amniotic fluid through the identification of those pregnancies at risk of meconium stained amniotic fluid

MATERIAL AND METHODS

This prospective study was conducted in NICU of department of Paediatrics of tertiary care centre from 1st January 2015 to 30th June 2016. Total 152 neonates meeting the inclusion and exclusion criteria constituted the material for this study.

Detailed history and clinical findings were recorded in the predesigned proforma. All babies with meconium stained amniotic fluid were taken into study irrespective of the gestational age were included into study while Neonates with Transient Tachypnea of Newborn, Respiratory Distress Syndrome, congenital pneumonia or congenital heart disease with congestive cardiac failure were excluded from the study. All neonates with meconium stained amniotic fluid admitted in NICU of tertiary care centre between 1st January 2015 to 30th June 2016, meeting the inclusion and exclusion criteria were included in the study. 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, Assesment of gestational age was done using modified Ballardscore, 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.

RESULT

Table 1: Showing sex distribution in MAS

Mode of delivery	MAS	Asymptomatic MSAF	Total
Male	37	39	76
Female	30	46	76
Total	**67**	**85**	**152**

(P-value=0.253 NS, Chi-Sq = 1.3)

In this study, it was found that there was no association between the sex of the babies and the MAS or asymptomatic MSAF.

Table 2: Shows the distribution of cases according to the gestation age (n=152)

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

The majority of the patients were full term i.e. Gestational age (wk.)> 37 were 99%.

Table 3: Show the distribution of cases according to the parity of the mother (n=152)

Parity of mother	No. of cases (n)	Percentage (%)
Primi	99	66
Multi	53	34
Total	**152**	**100**

The majority of the patients were born to Primi mothers (66%)

Table 4: Shows 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	18	27
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 5: Showing 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

In this study, it was found that there was a significant association between thick MSAF and the development of MAS (P-value=35.68, X^2=<0.001HS)

DISCUSSION

The first evidence of meconium in the fetal intestine appears at approximately 10th week to 12th week of gestation[8]. It consists of various products of secretion, excretion and desquamation by gastrointestinal tract and also undigested debris from swallowed amniotic fluid, such as desquamated cells of skin and intestine, lanugo hair and vernix caseosa[9]. 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

1. Presence of thick viscous meconium cap at the distal end of a GIT.
2. Pronounced peristaltic movements are unusual in foetus and
3. 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 peasoup appearing MSAF and the resultant outcome. In the present study, out of 1350 babies admitted, 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*[10], the incidence of MSAF was found to be 12% which are

comparable to the present study. In a study conducted in PGIMER, Chandigarh[11], incidence of MSAF was found to be 7.48%. 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. Ramakishore *et al*191 50 24 (48%) 26 (52%) In the present study, it was found that babies with MSAF were equally distributed in both sexes In the present study, it was observed that higher proportion of cases with MSAF were primigravida. The results of the other two

studies were also similar with higher proportion of cases with MSAF were primigravida. This may be explained by the problems like prolonged labor which is very common in primigravida. 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.

Major Risk Factors	Ramakishore *et al*[13] (n=50)	Chandran *et al*[12](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%)
Oligohydramnois		20 (7%)	11 (7%)
APH		02 (1%)	02 (1%)
Fetal distress	14 (28%)	24 (8%)	27 (18%)
Post Term	04 (8%)	51(17%)	17 (11%)
Cord around neck	08 (16%)		04 (3%)

CONCLUSION

It can be concluded from our study that the majority of the patients were full term i.e. Gestational age (wk.) > 37 were, Primi and also anemia was the most frequent perinatal risk factor followed by fetal distress and PIH. It was found that there was a significant association between thick MSAF and the development of MAS.

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