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Original Research Article

Respiratory distress in vigorous babies born through meconium stained amniotic fluid: incidence, onset, risk factors and predictors at birth

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ABSTRACT

Background: One in every seven pregnancies ends with meconium-stained amniotic fluid (MSAF). MSAF can be harmful to the newborn with short and long-term sequelae. This study was aimed to find out the incidence, predictors, onset and severity of respiratory distress among vigorous babies born through meconium stained amniotic fluid which may or may not be evident at birth.
Methods: It is a prospective observational study. One hundred forty-one neonates were studied. Data was collected on perinatal risk factors, clinical course and development of respiratory distress. Significance of the perinatal risk factors were identified by fisher's exact test (p-value) and score based on odds ratio was assigned for significant risk factors.
Results: This study included one hundred and forty-one vigorous babies born through meconium stained amniotic fluid, of which 36.9% (52) babies developed respiratory distress. Of the 52 babies who developed respiratory distress 19.23%(10 babies) developed meconium aspiration syndrome (MAS). In our study, it was observed factors like caesarean section and thick meconium increased risk of respiratory distress in the neonates born through meconium stained amniotic fluid who were vigorous.
Conclusions: The incidence of respiratory distress in vigorous babies born through meconium stained liquor in this study was observed to be 36.9% (52 babies). 98.07% (51 babies) developed respiratory distress at birth or within one hour of life. All the babies who developed MAS had mild or moderate form of MAS. None of the babies required assisted ventilation. Risk factors like thick meconium, caesarean section showed significant increase in the incidence of respiratory distress. Therefore intrapartum monitoring and timely intervention can prevent the complications of MAS.

Keywords: Respiratory distress, Meconium stained amniotic fluid, MAS, Vigorous neonate

INTRODUCTION

One in every seven pregnancies ends with meconium-stained amniotic fluid (MSAF). MSAF can be harmful to the newborn with short and long-term sequelae. In utero gasping and deep breathing, which occurs with sustained hypoxia predispose to MSAF and aspiration of meconium.[1] Meconium staining of the amniotic fluid (MSAF) occurs in around 4% of deliveries before 37 weeks, 10 - 20% of term deliveries, and up to 30 - 40% of post-term deliveries. Meconium aspiration is defined as the presence of meconium below the vocal cords. The meconium aspiration syndrome (MAS) develops in 2.0% to 9% of infants born through MSAF.[2] Meconium aspiration syndrome is a disease of the term and near-term infant. The disease is characterized by early onset of respiratory distress, with poor lung compliance and hypoxemia clinically and patchy opacification and

hyperinflation radiographically.[3] Mild MAS requires less than 40% oxygen for less than 48 hours. Moderate MAS requires more than 40% of oxygen for more than 48 hours with no air leak. Severe MAS requires assisted ventilation for more than 48 hours and is often associated with PPHN.[4] Several factors, e.g. abnormal fetal heart rate, Caesarean delivery, thick MSAF, male gender, low Apgar scores have been associated with an increased risk of developing MAS.[5] The disease is associated with high morbidity and the reported mortality rate is 4 to 5%.[6] Though the risk of developing respiratory distress is less among vigorous than non-vigorous, they are more likely to get missed or detected late when not monitored postnatally.[7] Aim of the study was to find out the incidence, predictors, onset and severity of respiratory distress developing within 24 hours of life including meconium aspiration syndrome among vigorous neonates born through meconium stained amniotic fluid which may or may not be at birth.

METHODS

Study was done at Sri Dharmasthala Manjunatheshwara College of Medical Sciences and Hospital, Dharwad, Karnatka, India for one year from 01 November 2013 to 31 October 2014. Prospective observational study was designed.

Inclusion criteria

Term neonates of gestational age more than 37 weeks with birth weight >2.5 kgs, born through Meconium stained amniotic fluid, vigorous at birth

Exclusion criteria

Neonates < 37 weeks of gestational age, neonates with birth weight < 2.5kgs, non-vigorous babies born through meconium stained amniotic fluid, neonates with congenital anomaly or respiratory distress due to other cause eg. surgical cause or suspected heart disease.

The vigour of the baby was assessed within the first 15 - 20 seconds of birth. The baby was considered vigorous when all the following criteria were met

- Heart rate >100
- Good muscle tone (baby should be actively moving the extremities or at least having flexed limbs)
- Strong respiratory efforts (regular breathing, with rate >30/min, symmetrically, equal and good chest rise).

These babies were monitored for initial 24 hours.

Chest X-ray, sepsis screen and blood culture were done for those babies developing respiratory distress.

Data regarding maternal risk factors and neonatal parameters were collected.

Descriptive statistics were applied (mean, standard deviation, percentage, frequencies). Chi-square test to find association between 2 variables. Odds ratio was calculated with 95% confidential intervals. P <0.05 was considered statistically significant.

RESULTS

One hundred forty-one vigorous babies born through meconium stained amniotic fluid were analysed. 36.9% (52 out of 141 babies) developed respiratory distress (Table 1). Out of the 52 babies who had respiratory distress, 19.2% (10) babies developed MAS (Table 2).

Perinatal factors were analyzed like maternal anemia, gravida, pregnancy induced hypertension, premature rupture of membranes, fetal distress, thick meconium stained liquor, term or post term gestation, mode of delivery of which mode of delivery (vaginal delivery) and thick meconium showed significant association (Table 3).

Table 1: Incidence of respiratory distress.

		Frequency	Percent
Respiratory distress	Absent	89	63.1
	Present	52	36.9
	Total	**141**	**100.0**

Table 2: Incidence of MAS in the vigorous babies born through MSAF who developed respiratory distress.

	Frequency (percent)
MAS	10 (19.2%)
No MAS	42 (80.8%)

The present study shows that babies born through caesarean section had an increased incidence of respiratory distress when compared with normal vaginal delivery with a significant p value of 0.02 and had 2.5 times the higher chance of developing respiratory distress as compared with normal delivery (Table 4).

The current study shows that infants born with thick meconium had increased incidence of respiratory distress when compared with thin meconium with a significant p value of 0.001 and had 3.51 times higher risk of developing respiratory distress (Table 5).

Babies with the birth weight between 2.5-3 kg had an increased incidence of respiratory distress with female preponderance. Causes of respiratory distress in non-MAS group was due to sepsis and transient tachypnea of newborn (Table 6).

Table 3: Perinatal and newborn parameters among the respiratory distress and no respiratory distress groups.

Parameters	Respiratory distress	No respiratory distress	Fisher's exact test (p value)
Primi	30 (57.7%)	44 (49.4%)	3.42
PIH	3 (5.8%)	10 (11.2%)	0.37
Anemia	2 (3.8%)	1 (1.1%)	0.55
PROM	13 (25.0%)	13 (14.6%)	0.13
Prolonged labour	2 (3.8%)	4 (4.5%)	1.00
Fetal distress	11 (21.2%)	10 (11.2%)	0.11
Breech	0	1 (1.1%)	1.00
Caesarean section delivery	42 (80.8%)	55 (61.8%)	0.02*
Thick meconium	39 (75.0%)	41 (46.1%)	0.001*
Staining-cord/skin/nail	52 (100%)	84 (94.4%)	0.16
Postdated/post term	19 (36.5%)	32 (36.0%)	2.26

*P – value <0.05: Statistically significant

Table 4: Comparison of respiratory distress v/s no respiratory distress with mode of delivery.

Mode of delivery	Respiratory distress	No respiratory distress
Normal vaginal delivery	10 (19.2%)	34 (38.2%)
Caesarean section	42 (80.8%)	55 (61.8%)

P value: 0.02 . Odds ratio: 2.59

Table 5: Comparison of respiratory distress v/s no respiratory distress with consistency of meconium.

Meconium	Respiratory distress	No respiratory distress
Thin meconium	13 (25.0%)	48 (53.9%)
Thick meconium	39 (75.0%)	41 (46.1%)

'p' value- 0.001 Odds ratio-3.51

Table 6: Causes of respiratory distress in the non - MAS group.

Cause	Non-MAS	Percentage
Sepsis	5	11.9%
Transient tachypnea of newborn	37	88.09%

Causes of respiratory distress in non-MAS group was due to sepsis and transient tachypnea of newborn.

DISCUSSION

Meconium aspiration syndrome is one of the most common cause of neonatal morbidity which leads to various sequelae and therefore it is essential to identify the risk factors in order to prevent poor outcome. In the present study total of 141 babies were included of which the incidence of respiratory distress was noted in 36.9% (52 babies) (Table 1).

Of the babies with respiratory distress, MAS was found to be the cause in 19.2% (10 babies) and the rest were categorized as non- MAS which consisted of 42 babies(80.8%) Table 2.

In our study we noted that babies with birth weight ranging from 2.5 - 3 kg had an increased incidence of respiratory distress, also respiratory distress was observed to be more in female babies (59.6%) than male babies (40.4%). However both these did not show any statistical significance with P values of 0.49 and 0.09 respectively. In a retrospective study done by Khazardoost et al, 21.1% (64 of 302) MSAF neonates were reported to have MAS, but in this study respiratory distress was monitored over the initial 4 hours of life, and 21.1% (64 out of 302) of these infants who developed MAS had an APGAR score of <6.[8] In a study done by Wisewell et al. which included apparently vigorous MSAF neonates showed respiratory distress in 7.1% neonates (149 patients) in which MAS was present in 3% (62 patients) and non-MAS distress in 4.2% (87 patients).[9] In our study the cause of respiratory distress in the non-MAS group were due to transient tachypnea of newborn in (88.1%) and sepsis (11.9%) (Table 6). Sepsis was confirmed with septic screen being positive in 4 babies and blood culture was positive in 1 baby. In a study by S.N. Singh et al, in which 77.27% (17 of 22 neonates) with non-MAS respiratory distress, the cause could represent transient tachypnea of newborn without classical radiological findings, or culture negative sepsis.[7] This observation correlates with that found in our studies.

The relationship of MAS in the presence of abnormal heart rate of the fetus, APGAR score of <6 and also the presence of thick meconium has been reported in literature.[10] In this study parameters such as gravida, PIH, anemia, PROM, prolonged labour, fetal distress, breech presentation, delivery by caesarean section, presence of thick meconium, staining of cord/skin/nail, postdated delivery, were taken as risk factors to predict the development of respiratory distress (Table 3).

Our study revealed that of the 52 infants who developed respiratory distress 67.3% (35 babies) had a APGAR score of 7 and 32.7% (17 babies) had a APGAR score of 8 at the end of 1 minute, which showed no statistical significance (p value - 0.37). APGAR score of 8 in 46.2% (24 babies) and 9 in 53.8% (28 babies) at the end of 5 minutes which also showed no statistical significance (p value-0.14).

This study shows newborns born through caesarean section had an increased incidence of respiratory distress when compared with normal vaginal delivery with a significant p value of 0.02 and had 2.59 times the higher chance of developing respiratory distress as compared with normal delivery (Table 4). Our study shows newborns born with thick meconium had increased incidence of respiratory distress when compared with thin meconium with a significant p value of 0.001 and it had 3.51 times higher risk of developing respiratory distress (Table 5).

Out of the 52 babies which developed respiratory distress 75% (39 babies) were born with thick meconium, out of which 9 babies had meconium aspiration syndrome. These vigorous babies with thick meconium were given routine care and were shifted to NICU to watch for any complications.[11] Respiratory distress at birth or within 12 hour of life was seen in all 52 infants, which emphasizes the need of initial 24 hours as the crucial period for monitoring. Finally, appropriate monitoring of respiratory distress at birth and assessing the high-risk cases will surely help in reducing the morbidity and mortality in vigorous babies born through MSAF.

CONCLUSION

The incidence of respiratory distress in vigorous babies born through meconium stained liquor in this study was observed to be 36.9% (52 babies). All the babies who developed MAS had mild or moderate form of MAS. None of the babies required assisted ventilation. Risk factors like thick meconium and caesarean section have shown significant increase incidence of respiratory distress. In all the 52 infants, respiratory distress developed within 12 hours of life. Therefore intrapartum monitoring and timely intervention can prevent the complications of MAS in babies born through MSAF.

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