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Original Research Article

Study of early neonatal outcomes in babies delivered through meconium-stained amniotic fluid in a rural teaching hospital

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ABSTRACT

Background: When the fetus is in a state of stress meconium is passed presence of meconium in amniotic fluid is potentially a serious Sign of fatal compromise, frequency of meconium strained amniotic fluid ranges from 5-22%. MSAF results in higher rate of cesarean delivery, NICU admission rate, respiratory distress, PPHN and neonatal death. The primary objectives of the study were to estimate the incidence of Meconium aspiration syndrome & Respiratory distress among babies born through meconium-stained amniotic fluid (MSAF) along with studying the outcomes at the end of 7 days.
Methods: This was a prospective study undertaken in mediciti institute of medical sciences, Ghanpur Medchal Mandal from Jan 2018 to June 2019. Data was collected in a predetermined proforma after institutional ethical committee clearance and appropriate informed consent.
Results: During this period 1972 neonates were delivered of which 216 babies were born through MSAF. 18 were excluded for non-cephalic presentation, multiple gestation or congenital anomalies.198 babies were included in the study (96 male and 102 female). 18 neonates (10.2%) needed resuscitation at birth. 85 (42.9%) had thick MSAF. 43 of them developed respiratory distress (21.7%). 10 babies were ventilated. Seizures, hyperbilirubinemia, thrombocytopenia were more common among babies with thick MSAF. Mortality was 1%.
Conclusions: Thick meconium-stained amniotic fluid was associated with low Apgar score, higher rate of emergency cesarean section and meconium aspiration syndrome. Primigravida mothers, maternal hypothyroidism and oligohydramnios were important risk factors associated with MAS.

Keywords: MSAF, Early neonatal outcomes, Maternal risk factors

INTRODUCTION

Meconium-stained amniotic fluid (MSAF) is considered an important sign of fetal compromise and is associated with a poor perinatal outcome. Incidence of meconium-stained amniotic fluid ranges from 7-22% while meconium aspiration syndrome (MAS) occurs in approximately 5% of all cases of MSAF.[1]

MSAF is considered a foreteller of fetal compromise because of its direct correlation with fetal distress and increased likelihood of aspiration of meconium and increase in perinatal morbidity and mortality.[1,2] MSAF is associated with low Apgar scores, increased need for resuscitation and increased NICU admission and prolonged NICU stay and higher perinatal mortality.[3] Infants born through MSAF are about 100 times more likely to develop respiratory distress.[4] The passage of meconium in utero is a sign of acute hypoxia and fetal distress. Vagal stimulation produced by cord or head compression also may be associated with passage of meconium as it causes relaxation of anal sphincter.

Meconium staining of amniotic fluid is seen more in mothers with increased gestational age, gestational hypertension, anemia, oligohydramnios, PROM as they

are associated with fetal hypoxia. MSAF predisposes perinatal mortality even in women with very low risk for obstetric complications. MSAF is associated with higher rate of caesarean delivery, instrumental delivery, NICU admission rate, respiratory distress, persistent pulmonary hypertension and neonatal death.[5]

Identification of maternal factors can predict the need for neonatal resuscitation at birth which will help to improve the perinatal outcome. Identification of MSAF also lead to better preparedness and ultimately reduce perinatal mortality and morbidity associated with MSAF.

Aim of this study was to identify various maternal risk factors and neonatal outcome of pregnancy complicated by MSAF and to compare neonatal outcome in patients with thick and thin meconium-stained amniotic fluid.

METHODS

This was a prospective study conducted at mediciti institute of medical sciences, level-II nursery, form January 2018 to June 2019. MIMS is a secondary care teaching hospital which caters to patients belonging to lower and middle-class social strata. Data was collected in a predetermined proforma after Institutional ethical committee clearance and appropriate informed consent from the attenders.

All babies born through MSAF with cephalic presentation were enrolled. Babies with congenital anomalies were excluded. Detailed history of babies born through MSAF was noted in a predesigned pro forma. Detailed history of mothers was taken with emphasis on age, parity, duration of labor, oligohydramnios, antepartum risk factors like anemia, gestational diabetes, pregnancy induced hypertension (PIH), pre-eclamsia and PROM (premature rupture of membranes etc. New born details like requirement of resuscitation, Apgar scores at 1 and 5 minutes, birthweight, mode of delivery, consistency of meconium, vigorous or non-vigorous babies, development of RDS (respiratory distress), MAS, NEC, neonatal hyper bilirubinemia.

Need of NICU admission was analyzed. All babies were followed up till 7th day of life, for babies who got discharged early attendants were asked to bring the baby on 3rd, 5th and 7th day for follow up.

All relevant data collected were tabulated in Microsoft excel and analysis was done by using computer software SPSS (statistical package for social sciences) chi square test was done to find out statistical relation between variables, $p<0.05$ was considered significant.

RESULTS

During this period 1972 neonates were delivered of which 216 babies were born through MSAF. 18 were excluded for non-cephalic presentation, multiple gestation or congenital anomalies. 198 babies were included in the study (96 male and 102 female). 18 neonates (10.2%) needed resuscitation at birth. 85 (42.9%) had thick MSAF.43 of them developed respiratory distress (21.7%). 10 babies were ventilated.

Table 1: Various maternal risk factors and their distribution among thick and thin MSAF.

Maternal risk factor	Thick MSAF (%)	Thin MSAF (%)	Total	P value
Anemia	29.4	25.7	27.3	0.6
Hypo-thyroidism	31.8	13.3	21.2	0.001
Gestational hypertension	14.1	7.9	10.6	0.1
Pre-eclamsia	7.1	3.5	5.1	0.2
Gestational diabetes	5.9	3.5	4.5	0.4
PROM	3.5	0.9	2	0.2
Oligo-hydramnios	3.5	-	1.5	0.04
Hypertension	-	1.8	1	0.2

Maternal risk factors studied were maternal anemia, hypothyroidism, gestational hypertension, pre-eclamsia, gestational diabetes mellitus, PROM and oligohydramnios. Out of these oligohydramnios and maternal hypothyroidism were statistically significant and primigravida was associate with higher incidence of MSAF. The incidence of MSAF increased with increasing gestational age (8% in <37 weeks GA, 18% in 38-42 weeks GA and 35% in>42 weeks GA).

MSAF increased the incidence of LSCS with 59.6% requiring LSCS, 8.6% needed instrumentation. Even elective LSCS (7.1%) was seen associated with MSAF.

Table 2: Neonatal outcome parameters amongst thick and thin MSAF.

Neonatal outcome	Thick MSAF	Thin MSAF	Total
Apgar score <7 at 1 min	26	6	32
Respiratory distress	28	15	43
PPHN	8	2	10
Ventilatory support	5	2	7
MAS	22	8	30
NEC	03	-	03
Hyperbilirubinemia	33	22	55
Polycythemia	2	3	5
Thrombocytopenia	5	3	8
Seizures	1	0	1
NICU admission (%)	47 (55.3)	33 (29.2)	80 (40.4)
Neonatal mortality (%)	02 (2.3)	-	02 (1)

Apgar scores at 1 min and 5 minutes were less in babies born though thick MSAF, compared to thin MSAF. The difference being statically significant showing the thick MSAF as the most significant single variable, influencing fetal outcome. NICU admission rate increased with MSAF (out of 216 babies born through MSAF, 80 babies were admitted in NICU) accounting for 40.4%. 18 neonates (10.2%) needed resuscitation at birth. 85 (42.9%) had thick MSAF. 43 neonates developed respiratory distress (21.7%) 30 having meconium aspiration and the rest had TTNB and pneumoniae. PPHN was diagnosed in 10 neonates (thick vs thin: 8 and 2). 7 babies (5 with thick MSAF and 2 with thin MSAF) were ventilated. The mean duration of ventilation was 3.9 days. Among neonates with MAS who had hypoxemia (PaO_2<50 mmHg), hypercarbia ($PaCO_2$>60 mmHg), or acidosis (pH less than 7.25) with an oxygen fraction (FiO_2)>0.6 were considered for mechanical ventilation. Rest was managed with supplemental oxygen with FiO_2 between 0.4 ~ 0.6. Two neonates died (1%). Among babies born through MSAF, neonatal hyperbilirubinemia was seen in 27.8%, thrombocytopenia in 4%, hypoglycemia in 0.5%, polycythemia in 2.5% and seizures in 0.5%. P value for difference between the thick MSAF and thin MSAF was significant i.e., <0.05 for PPHN, need for ventilatory support and NEC.

Table 3: Demographic parameters among thick and thin MSAF.

Demographic parameter	Thick MSAF	Thin MSAF	Total
Maternal age (year)			
<20	6	7	13
20-25	53	70	123
26-30	18	34	52
31-35	7	2	9
>35	1	Nil	1
Parity			
Primi gravida	50	67	117
Multigravida	35	46	81
Gestational age (weeks)			
<28	-	-	-
28-32	-	-	-
32-36	3	1	4
37-40	80	104	184
>40	2	8	10
Mode of delivery			
Vaginal delivery	15	48	63
Instrumental delivery	7	10	17
Emergency LSCS	54	50	104
Elective LSCS	9	5	14
Gender			
Male	47	49	96
Female	38	64	102

DISCUSSION

Meconium-stained amniotic fluid is associated with high rates of cesarean section, perinatal morbidity and mortality. The rate of meconium-stained amniotic fluid varies from 12-20%. It is higher in underdeveloped countries. In our study we found incidence of 10.9% for MSAF. As gestational age increases, the incidence of MSAF also increases which was very obvious in this study. MSAF was seen in 3% of pregnancies less than 37 weeks, in 10.3% of term pregnancies and in 20% of post term pregnancies

We found 57.1% of cases having thin MSAF and 42.9% having thick meconium-stained amniotic fluid. These findings were consistent with the study by Rajput et al and is contrary to Naveen et al.[2,6]

Thick meconium led to more NICU admissions when compared to their counterparts amounting to 40.4%, which is similar to study done by Kumar et al.[7]

In the present study, maternal risk factors associated with MAS were anemia, hypothyroidism, gestational hypertension, pre-eclamsia, gestational diabetes, oligohydramnios, PROM and chronic hypertension. Among these ~ oligohydramnios, hypothyroidism was having statistically significance risk with p value<0.05.

Meconium aspiration syndrome is a well-known complication of MSAF with incidence of 15.15% which was higher than four other studies done by Keziah et al, Kamble et al, Swain et al, Ratt et al, and was lower than the incidence observed by Khazardoost et al who reported an incidence of 21.2%.[8-12] Lower incidence of meconium aspiration syndrome is attributed to effective neonatal resuscitation and selective intubation for depressed neonates at birth.

In the present study respiratory distress was seen in 21.7% (n=43) of neonates. Among these 32 were with thick MSAF and 11 with thin (p<0.05). Singh et al reported a rate of 33.4% for respiratory distress and 25.9% for MAS.[13] Liu et al however reported a very low rates of 6.8 and 3.4% for respiratory distress and MAS.[14] Other studies reported respiratory distress from 5.6 to 24.6% and MAS from 1.7 to 35.8%.[15,16]

NEC in the present study was seen in 1.5% of neonates born through MSAF. Singh et al reported a higher incidence of NEC (9.4%).[17] Thomas et al did not find any relation between NEC and MSAF.[18] Cheng et al however found that MSAF as a factor for NEC.[19]

The mortality rate in the present study was 1%. Two out of 198 neonates died. One was a female with low-birth weight neonate delivered vaginally, Apgar <3 at birth, developed MAS, had severe PPHN, ventilated and succumbed on day 5 with pulmonary hemorrhage. Another was a male born by emergency LSCS for fetal

distress, Apgar <3 at birth, had MAS, developed seizures on day 4, was ventilated, had persistent hypoxia, hypercarbia and acidosis and succumbed on day 6. Gupta et al reported a mortality of 0.5%, whereas Garg et al and Rajlaxmi et al reported a mortality rate of 5 and 3.03% respectively.[1,20,21]

In the present study, neonatal hyperbilirubinemia is seen in 27.8% (55/198) babies, with 33 babies out of 55 born with thick MSAF and 22 with thin MSAF, was found to be statistically significant. In a study done by Ashtekar et al incidence of neonatal hyperbilirubinemia among babies born with MSAF was found to be 23.2%.[22] In a study by Bhatia et al, neonatal hyperbilirubinemia is seen in 22.54% of babies with MSAF.[23]

In the present study, thrombocytopenia is seen in 4% (8/198) babies, with 5 babies out of 8 born with thick MSAF and 3 with thin MSAF, was found to be statistically not significant. In a study by Singh et al, thrombocytopenia is seen in 5.9% (5/85) neonates with MSAF. In a study by Fedakar et al thrombocytopenia is seen in 2.9% (3/101).[24]

In the present study, hypoglycemia is seen in 0.5% (1/198) babies, born with MSAF. It was associated with thick MSAF, was found to be statistically not significant. Similar to a study by Kamble et al, hypoglycemia is seen in 0.5% (7/1220) babies with MSAF.

In the present study polycythemia is seen in 2.5% (5/198) babies, with 2 babies out of 5 born with thick MSAF and 3 with thin MSAF, was found to be statistically not significant. In a study by Firdaus et al polycythemia is seen in 18% of babies born with MSAF.[25]

In the present study, seizures are seen in 0.5% (1/198) babies, born with MSAF. It was associated with thick MSAF, was found to be statistically not significant. Similar to a study by Swain et al, seizures are seen in 0.5% (1/175) babies with MSAF.[10] In a study done by Bhatia et al, seizures are seen in 3.35% (6/179) babies with MSAF.[25]

Limitations

of this study were thick and thin staining of meconium was classified subjectively and blood gas studies were not done for all neonates.

CONCLUSION

Thick meconium-stained amniotic fluid has a major impact on both mode of delivery and neonatal outcome as compared to other counterparts. Oligohydramnios, hypothyroidism were major and significant maternal risk factors associated with MSAF. Therefore, the presence of thick meconium-stained amniotic fluid needs close monitoring, early and timely obstetrical intervention and appropriate postnatal care, in order to minimize meconium related complications and improve neonatal outcomes.

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