Original Articles

MECONIUM STAINED AMNIOTIC FLUID: ANTENATAL, INTRAPARTUM AND NEONATAL ATTRIBUTES

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Objectives: *To find out the incidence, outcome as well as antenatal, intrapartum and neonatal attributes of meconium stained amniotic fluid (MSAF).* ***Design:*** *Prospective study.* ***Setting:*** *Neonatal Unit of Hospital.* ***Subjects:*** *1426 live births occurring in 1500 consecutive deliveries, over one year period.* ***Interventions:*** *In all babies born through MSAF, thorough oropharyngeal suction as soon as the head was delivered followed by immediate intratracheal intubation and suctioning in infants depressed at birth.* ***Results:*** *204 (14.3%) deliveries had MSAF of which thick meconium was present in 141. Hepatitis in mother, fetal distress during labor and intrauterine growth retardation were significant factors associated with MSAF. One fifth of babies born through MSAF suffered severe birth anoxia compared to 5.6% in non-MSAF group. The consistency of meconium had direct bearing on the neonatal outcome. Severe birth asphyxia (SBA) occurred in 27.0 and 6.3% of babies with thick and thin meconium staining, respectively. Meconium aspiration syndrome was observed in 9 babies of thick meconium group and 8 of these were depressed at birth. All deaths occurred in thick meconium group and were associated with SBA.* ***Conclusions:*** *Selective approach can be adopted for babies with MSAF reserving intratracheal suctioning at birth for depressed neonate or evidence of fetal distress in utero. Rest of the neonates only need careful observation after thorough oronasopharyngeal suctioning.*

Key words: *Meconium, Meconium stained amniotic fluid, Meconium aspiration syndrome, Birth asphyxia, Amniotic fluid.*

MECONIUM staining of amniotic fluid (MSAF) has for long been considered to be a bad predictor of fetal outcome and meconium aspiration syndrome (MAS), a major cause of perinatal morbidity and mortality. In a large series (l), MSAF was found in 12% of *1,77,000* live births. One third of such infants may have meconium below the vocal cords (meconium aspiration). MAS occurs in 1-3% of all cases of MSAF and in 10-30% of neonates with meconium aspiration(2,3). The management of babies born through MSAF has undergone significant change in the last two decades and a "selective" approach is being advocated(4). The present study was undertaken to detect the antenatal and intrapartum variables as well as outcome of meconium stained amniotic fluid.

Subjects and Methods

One thousand four hundred and twenty six live births occurring in 1,500 consecutive deliveries during a period of one year from October 1993 to September 1994 in SSL Hospital, Banaras Hindu University, constituted the study subjects. The live births were then categorized into MSAF

and non-MSAF groups and compared for variables like maternal age, parity, antenatal complications (antepartum hemorrhage, pregnancy induced hypertension, eclampsia, *etc.)* and complications during labor (obstructed or prolonged labor, fetal distress). MSAF was further categorized on the basis of meconium consistency into thick (dark green in color, "pea soup" consistency with particulate matter) and thin (lightly stained yellow or greenish color) meconium and compared for incidence of birth asphyxia, MAS and mortality. MAS was defined as respiratory distress soon after birth, radiological evidence of aspiration pneumonia in presence of MSAF in meconium staining of skin/nails/cord or presence of meconium in the oropharynx/ trachea(5).

In all babies born through MSAF, thorough oro-pharyngeal suction was done as soon as the head was delivered. Immediate intra tracheal intubation and suctioning was done to suck out thick/thin meconium in a depressed infant at birth. In vigorously crying neonates, no intubation was done and they were carefully observed for development of any respiratory distress subsequently.

Chi-square with Yate's correction and Z test were used to test the statistical significance of the results.

Results

On 1426 live births, 204 (14.3%) had meconium stained amniotic fluid (141 with thick meconium and 63 with thin meconium staining). The male-female ratio was 1.1:1. *Table I* gives the prevalence of MSAF in relation to weight and gestation. MSAF was significantly greater in post-term deliveries (55%) compared to deliveries occurring before 42 weeks of gestation. In term deliveries, MSAF was significantly greater in pregnancies associated with fetal growth retardation ($p < 0.001$).

MSAF was more common in pregnancies associated with antenatal complications like pregnancy induced hypertension, pre-eclamptic toxemia, antepartum eclampsia, hepatitis and severe anemia *(Table II),* but significant only in mothers with hepatitis (x^2 6.16, $p < 0.01$). Since only one factor was significant, multivariate analysis was not done. During labor, MSAF was significantly more frequent in pregnancies with fetal distress (50.0%) compared to those without fetal distress (11.6%). Maternal age and parity did not influence MSAF.

Analysis of outcome of neonates born through MSAF revealed that 24.5% of babies had Apgar scores <7 at 1 min compared to 6.3% in those without MSAF ($p < 0.001$). Neonatal deaths occurred in 4.9% of babies with MSAF compared to 2.8% amongst those without MSAF. These differences were insignificant.

Analysis of meconium consistency revealed that 6.4% babies born through thick meconium developed MAS compared to none in the thin meconium group. Apgar

TABLE I - *Prevalence of MSAF in Relation to Gestation and Birth Weight*

Parameter	No. of cases	MSAF (%)
Gestation (weeks)		
<37	204	16 (7.8)
37-41	1202	177 (14.7)
>42	20	11 (55.0)
Birth weight (g)		
<1500	51	2 (3.9)
1501-2500	404	70 (17.3)
2501-3500	901	121 (13.4)
>3500	70	11 (15)

TABLE II–*Antenatal and Intrapartum Factors Associated with MSAF*

Maternal complications	MSAF (%) (n = 204)		Non-MSAF(%) (n = 1222)		χ^2 value
Antenatal					
APH	5	(2.5)	38	(3.1)	0.08
PIH + PET	8	(3.9)	38	(3.1)	0.16
APE	7	(3.4)	18	(1.5)	2.83
Heart disease	2	(1.0)	20	(1.6)	0.16
Hepatitis	6	(2.9)	9	(0.7)	6.16**
Severe anemia	2	(1.0)	9	(0.7)	0.01
Intrapartum					
Fetal distress	50	(24.5)	50	(4.1)	111.72***
(*i*) Fetal distress alone	36	(17.6)	37	(3.0)	76.96***
(*ii*) Fetal distress with obstructed labour	5	(2.5)	2	(0.2)	14.36***
(*iii*) Fetal distress with failed progress	5	(2.5)	7	(0.6)	05.29*
(*iv*) Fetal distress with cord problems (tight loop, cord prolapse)	4	(2.0)	4	(0.2)	5.64*
Non progress of labor	9	(4.4)	66	(5.4)	0.18
Obstructed labor	4	(2.0)	12	(1.0)	0.63
Cord problems (tight loop, true knot)	3	(1.5)	13	(1.1)	0.023
Prolonged rupture of membrane (> 24 h)	3	(1.5)	39	(3.2)	1.26

* $p < 0.05$; ** $p < 0.01$, *** $p < 0.001$.
APE–Antepartum eclampsia; APH–Antepartum hemorrhage,
PIH–Pregnancy induced hypertension; PET–pre-eclamptic toxemia

score < 3 at 1 min was significantly greater (27%) in those with thick meconium compared to those with thin meconium (6.3%). It was also noted that while 8 babies born with thick meconium died, all in the thin meconium group survived.

Discussion

In the present study, the incidence of MSAF was 14.3% of total live births. Other studies have reported incidence varying between 7-22% of live births(1-3,6,7). Meconium passage is uncommon before 38 weeks(8). In post term pregnancies the incidence varies from 28-52%(8-10). In the present study, the incidence of MSAF in post-term pregnancies was 55% whereas in preterms it was 7.8%. Among the 16 preterms, 12 (75%) were between 34-36 weeks and the remaining 4 were <34 weeks (28, 30, 32 and 33 weeks). These 4 babies were born to mothers with maternal complications, *viz.*, APE, PET, severe anemia and hepatic encephalopathy.

Of the various antenatal complications studied, only hepatitis was significantly associated with MSAF. During labor, fetal distress was significantly high in pregnancies with MSAF. Therefore, careful monitoring of fetal well being during labor may go a long way in preventing MSAF. Full

term IUGR babies were also at increased risk of being meconium stained. Similar views have been expressed by other workers(2,3,ll)- The incidence of birth asphyxia was significantly high in the MSAF group compared to non-MSAF group ($p < 0.001$). Other studies have also reported increased incidence of low mean 1 minute Apgar score in MSAF babies(ll-13).

The "thickness" of meconium had a direct bearing on the neonatal outcome. Incidence of birth asphyxia was significantly higher in thick meconium compared to thin meconium. There was no mortality in thin MSAF with birth asphyxia group. All cases of MAS were seen only in the thick meconium group as has been observed by many other workers(2,7,13,14) reporting MAS predominantly with thick meconium. However, thin meconium has also been reported to cause MAS inspite of normal Apgar score at birth but these mothers had fetal distress during labor. The incidence of MAS was very high in babies with low 1 minute Apgar scores inspite of repeated intratracheal suctioning to remove meconium which gives credence to the theory that meconium aspiration is predominantly an intrauterine event which occurs in response to continued fetal gasping in a hypoxic environment and tracheal suctioning at birth can not completely eliminate development of MAS(14,17). Reported mortality due to MAS is variable ranging from 0-40% in different studies (18,19). In the present series, it was 22.2%.

In view of the above observations, we conclude that thick or thin MSAF in absence of antecedent maternal risk factors or signs of fetal distress *in utero* does not pose a serious threat to fetal well being and such babies do not need intratracheal suctioning at birth if they are vigorous. Thick MSAF in presence of low 1 minute Apgar score is directly responsible for high neonatal morbidity and mortality. Therefore, a "selective" approach of tracheal suctioning can be adopted for babies born through MSAF(4,20,21), reserving it for those babies with evidence of fetal distress *in utero* and/or, who are in a depressed state at birth. Vigorous neonates only need careful observation after thorough oronasopharyngeal suction.

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NOTES AND NEWS

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