

IMPACT OF MECONIUM STAINED AMNIOTIC FLUID ON EARLY NEONATAL OUTCOME

Uday Rajput¹, Anu Jain²

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ABSTRACT: OBJECTIVE: To find out the incidence, neonatal outcome and associated maternal antepartum & intrapartum risk factors of meconium stained amniotic fluid (MSAF). **DESIGN:** Prospective Study. **SETTINGS:** Neonatal Unit of Hospital and PNC Ward. **SUBJECTS & METHODS:** Prospective Study was conducted including 100 babies born with meconium stained amniotic fluid who are admitted in NICU and with mother in PNC ward in a period of six months (April 2012-October 2012) excluding those who born with congenital abnormalities. Detail history of babies and mother with MSAF noted with emphasis on antepartum and intrapartum risk factors and outcome in terms of morbidity and mortality. **RESULTS:** Incidence of MSAF in the study was 8.98%. Out of 100, 24 babies were admitted to NICU with most common indications being birth asphyxia (16%) and Meconium Aspiration Syndrome (MAS) (6%). Majority babies were delivered through thin Meconium Stained Liquor (MSL) (44%) followed by thick (35%) and moderate (21%). Total number of deaths were 9 and all these babies had thick meconium with severe birth asphyxia. Ninety one babies were born at >37 weeks of gestation and 57 had birth weight over 2.5 Kg. Nineteen percent were non vigorous requiring tracheal suctioning and positive pressure ventilation at birth. Common mode of delivery was emergency Cesarean in 83% patients. Common maternal and fetal risk factors were fetal distress (30%) followed by Oligohydramnios (30%), Pregnancy induced hypertension (PIH) (24%), anemia (14%), severe anemia (5%), Antepartum hemorrhage (4%) and Antepartum eclampsia (4%). **CONCLUSIONS:** Oligohydramnios, PIH, anemia and fetal distress were common antenatal and intranatal factors associated with MSAF. Major morbidity and indication for NICU admission was Birth asphyxia and non vigorous babies. Mortality rate was 9% which is commonly associated with thick meconium and severe birth asphyxia.

KEY WORDS: Meconium stained amniotic fluid, meconium aspiration syndrome, early neonatal outcome

INTRODUCTION: Meconium Aspiration Syndrome (MAS) continues to be threat to many newborns throughout the world with a case fatality rate of 5% (as much as 40%), in addition to short and long term pulmonary and neurodevelopmental sequelae⁽¹⁾

India has the unfortunate distinction of claiming more than a quarter of the total newborn deaths in the world⁽²⁾. One such attribute is meconium stained amniotic fluid (MSAF) which complicates delivery in approximately 8% to 15% of live births⁽³⁾. In a large series, MSAF was found in 12% of 1,77,000 live births. MAS occurs in 1-3% of all cases of MSAF and in 10-30% of neonates with meconium aspiration⁽⁴⁾.

Various risk factors are associated with increased mortality and morbidity in MAS like post-term babies, primipara and grand multipara, unbooked mothers, mothers with toxemia of pregnancy or prolonged rupture of the membranes, infants with moderate or severe birth asphyxia and

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operative deliveries⁽⁵⁾. Thick MSAF is more likely with maternal age >30, postdated pregnancy, and fetal distress⁽⁸⁾

With facilities like continuous fetal heart monitoring, fetal Doppler, scalp pH estimations, the degree of fetal compromise can be evaluated early⁽⁶⁾. But, in a developing country like ours, where most peripheral centers are devoid of facilities for managing high risk deliveries or giving essential newborn care and over 60% births are domiciliary, the role of anticipation and timely referral assumes great importance. It can not only reduce neonatal morbidity and mortality but also has maternal implications⁽⁸⁾. Hence, the present study was undertaken to detect the antenatal and intrapartum clinical variables in mother as well as outcome of MSAF in early neonatal period.

SUBJECTS AND METHODS: A prospective observational study was carried out over a 6 month period from April 2012 to October 2012 in the Neonatal unit and PNC Ward of Government Medical College and Hospital, Miraj.

Hundred neonates delivered through meconium stained amniotic fluid consecutively which includes inborn as well as outborn neonates admitted to NICU & those with mother in PNC ward were included in the study. Babies born with MSAF who were having significant life threatening congenital abnormalities were excluded from this study.

Detail history of babies delivered with MSAF were noted with special emphasis on factors like need of resuscitation, vigorous, non-vigorous babies, need for NICU admission, consistency of meconium etc. and detail history of mothers was taken with emphasis on antepartum and intrapartum risk factors like any medical disease to mother, obstetric complications, cord problems, fetal distress etc.

Consistency of meconium was divided into thin, thick and moderate. Thick meconium was characterised by opaque and deep green coloured liquor whereas thin meconium was characterised by translucent and light yellow green coloured amniotic fluid and while opalescent liquor with colour in between deep green and light yellow green represent moderate meconium.

Morbidity of neonates were noted with emphasis on Meconium Aspiration Syndrome (MAS), Respiratory distress, hospitalization duration, time of initiation of feed, birth asphyxia, ventilatory requirement, sepsis, growth retardation, gestational age, weight, etc. Babies were followed up till the time of discharge and mortality was noted.

RESULTS: During the study period, a total of 1113 deliveries were conducted. Of these 100 (8.98%) had meconium stained amniotic fluid. Forty four percent had thin meconium stained liquor, 35% had thick while 21% had moderately meconium stained liquor.

Incidence was found to be more in male neonates (55%). The male-female ratio was 1.2:1. MSAF was greater in term deliveries (91%) whereas in preterm deliveries, thick meconium found in majority cases (55.6%). A total of 53% babies born through MSAF had weight between between 2.5 and 3.5 kg followed by 40% babies having low birth weight (1.5 -2.5 kg). Mothers having low birth and very low birth weight babies had thick meconium predominantly (Refer Table. I)

Common mode of delivery was Caesarean Section (83%) (Refer Table II) MSAF was more common in pregnancies associated with antenatal complications like Oligohydramnios (30%), pregnancy induced hypertension (24%), anemia (14%), antepartum eclampsia (4%) and antepartum hemorrhage (4%). During labour, MSAF was more frequent in pregnancies with fetal

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distress (30%). Postdate pregnancy was found to be major risk factor with an incidence of 33% (Refer Table. III)

Twenty four percent babies were admitted to NICU in which 21 were admitted at birth and 3 babies after 24 hours. Thick meconium was an important indicator of NICU admission with an incidence of 58.3%. Mean NICU stay were 4 days. Mortality rate was 9% in which 8 babies (88.8%) born in thick meconium group and 1 in thin meconium group (Refer Table. IV). Analysis of neonatal outcome shows that birth asphyxia was the main cause for NICU admission. Meconium aspiration syndrome developed in 6% of MSAF babies with frequency higher with thick meconium (83.3%) (Refer Table. V).

Among 100 babies, 81% were vigorous. Thick meconium was more common in non vigorous babies (63.15%) (Refer Table. VI). Resuscitation modalities were stimulation alone in 17%, positive pressure ventilation in 13%. Chest compression given to 6% babies and adrenaline to 8%. Resuscitation measures were performed predominantly in neonates born through thick MSAF (Refer Table. VII).

DISCUSSION: Meconium stained amniotic fluid (MSAF) is a frequent occurrence seen in obstetric and neonatal practice. In present study, the incidence of MSAF was 8.98%. Comparable results were noted by other studies. (6, 10, 11, 16)

High prevalence of MSAF seen in male neonates with an incidence of 55%. Similar results were noted by National Neonatal Perinatal Database 2002-2003 (16) and Vineetgupta et al (4). Regarding gestational age, this study shows that 33% women were postdated which is consistent with NekeAkhtar et al (7), Sankhyan Naveen et al (8) and Shaikh et al (9). The hormone motilin is secreted in ever increasing quantities by the fetus as gestation advances and most meconium discharges are said to occur in postdate gestations, because the motilin levels are highest then (8). In the present study, 91% babies were term. Finding was comparable with other studies (11, 13) A. Narang et al concludes that majority babies were good weight with 76% weighing more than 2.5 Kg, 6.4% below 1.5 Kg and only 5.5% with MSAF were weighing less than 2 kg (11). In our study, 53% babies had birth weight between 2.5 Kg and 3.5 Kg and 40% had low birth weight. Some studies reported its higher prevalence in pregnancies associated with fetal growth retardation (4) but, in utero passage of meconium in premature infants is uncommon.

Mode of delivery is significantly affected by meconium staining of liquor and it is stated that Caesarean sections were performed twice as frequently in women presenting with MSAF (9). Incidence of Cesarean section was 83% in our study. Similar result observed by Shaikh et al in 2010 (9).

Of the various antenatal complications, Oligohydramnios, Pregnancy induced hypertension and Anemia had shown high prevalence in association with MSAF with an incidence of 30%, 24% and 14% respectively. In this study, incidence of oligohydramnios and PIH was higher than those reported by other authors (8, 12, 16). As this study had been conducted in a tertiary center where a large number of complicated pregnancies including oligohydramnios and PIH are referred, their incidence was higher. During labour, fetal distress was high in pregnancies with MSAF with an incidence of 30%. Vineeta gupta et al also showed a high incidence of fetal distress (4).

Thick meconium is associated with more admissions to NICU as concluded by Nirmala Duhan et al (6) which was also seen in the present study as it is more often associated with birth asphyxia,

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MAS and other neonatal outcomes as compared to thin meconium. Nekeakhtar et al observed that birth asphyxia is main cause for NICU admission in neonates associated with meconium passage in utero⁽⁷⁾. Our study confirms this observation showing 16% incidence.

This study showed that 19% neonates were non vigorous associated predominantly with thick meconium (63.15%). These babies require immediate suctioning. If the infant is vigorous, endotracheal suction is not recommended, because it may cause harm and does not improve the outcome⁽¹⁵⁾. Incidence of neonatal death associated with MSAF varies from 4.9% in study of Vineetgupta et al⁽⁴⁾ to 7% in Takroni et al study⁽¹⁴⁾. In the present study, it was 9%.

In the end it is concluded that the knowledge of antenatal and intrapartum factors associated with MSAF provides easy prediction of adverse outcomes in neonates who can be managed by optimal timely intervention in order to avoid severe asphyxia and meconium aspiration and its complications.

KEY MESSAGES:

1. Antenatal and intranatal factors associated with MSAF provide a way of early identification of high risk cases in resource poor setup where facilities like electronic fetal monitoring are not available.
2. Higher incidence of birth asphyxia, Meconium Aspiration Syndrome and other morbidities associated with thick meconium compared to thin and moderate meconium.

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CHARACTERISTICS	THIN* (n=44)	THICK* (n=35)	MODERATE* (n=21)
SEX (%)			
Male (55)	23 (41.8%)	20 (36.4%)	12 (21.8%)
Female (45)	21 (46.66%)	15 (33.3%)	9 (20%)
GESTATION WEEKS (%)			
<37 (9)	2 (22.2%)	5 (55.6%)	2 (22.2%)
37-41 (91)	42 (46.15%)	30 (32.9%)	19 (20.8%)
>42	-	-	-
BIRTH WEIGHT (GMS) (%)			
<1500 (3)	-	3	-
1501-2500 (40)	16 (40%)	17 (42.5%)	7 (17.5%)
2501-3500 (53)	27 (50.9%)	15 (28.3%)	11 (20.7%)
>3500 (4)	1 (25%)	-	3 (75%)

Table 1. Baseline characteristics of Study Cases

*Consistency of meconium

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MODE OF DELIVERY (%)	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
CESAREAN SECTION (83)	32 (38.5%)	31 (37.3%)	20 (24.09%)
VAGINAL (17)	12 (70.5%)	4 (23.5%)	1 (5.88%)

Table 2. Mode of delivery and Meconium staining of liquor

VARIABLES ASSOCIATED WITHMSAF	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
ANTEPARTUM FACTORS			
APH (4)	2 (50%)	2 (50%)	-
PIH (24)	11 (45.8%)	7 (29.16%)	6 (25%)
APE (4)	1 (25%)	3 (75%)	-
OLIGOHYDRAMNIOS (30)	11 (36.6%)	16 (53.3%)	3 (10%)
POLYHYDRAMNIOS (4)	3 (75%)	-	1 (25%)
ANEMIA (14)	4 (28.57%)	5 (35.71%)	5 (35.71%)
SEVERE ANEMIA (5)	3 (60%)	1 (20%)	1 (20%)
HEPATITIS (1)	-	-	1
JAUNDICE (1)	-	-	1
RVD (2)	2	-	-
INTRAPARTUM FACTORS			
FETAL DISTRESS (FD) (30)	9 (30%)	14 (46.6%)	7 (23.3%)
(1) FD ALONE (20)	6 (30%)	11 (55%)	3 (15%)
(2) FD WITH OL (3)	1 (33.3%)	1 (33.3%)	1 (33.3%)
(3) FD WITH NPL (1)	-	1	-
(4) FD WITH CORD PROBLEMS (6)	2 (33.3%)	1 (16.6%)	3 (50%)
NON PROGRESS OF LABOR (1)	-	1	-
OBSTRUCTED LABOR (6)	2 (33.3%)	4 (66.6%)	-
CORD PROBLEMS (6)	6	-	-
PROM (8)	4 (50%)	3 (37.5%)	1 (12.5%)
POSTDATE PREGNANCY (33)	16 (48.48%)	8 (24.2%)	9 (27.2%)

Table 3. Antenatal and Intrapartum factors associated with MSAF

	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
ADMISSION TO NICU (24)	7 (29.16%)	14 (58.3%)	3 (12.5%)
ADMISSION AT BIRTH (21)	5 (23.8%)	14 (66.66%)	2 (9.52%)
ADMISSION AFTER 24 HOURS (3)	2 (66.66%)	-	1 (33.33%)
DEATH (9)	1 (11.1%)	8 (88.8%)	-
DISCHARGE (15)	6 (40%)	6 (40%)	3 (20%)

Table 4. Admission to NICU and Neonatal mortality

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MORBIDITY (%)	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
BIRTH ASPHYXIA (16)	4 (25%)	10 (62.5%)	2 (12.5%)
MAS (6)	1 (16.6%)	5 (83.3%)	-
HIE (3)	1 (33.3%)	1 (33.3%)	1 (33.3%)
PULMONARY HEMORRHAGE (1)	-	1	-
RDS (2)	-	2	-
SEPTICEMIA (4)	-	4	-
MDS (2)	-	2	-

Table 5. Outcome of babies born through meconium stained amniotic fluid

CONDITION OF BABY (%)	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
VIGOROUS (81)	38 (46.91%)	23 (28.39%)	20 (24.69%)
NON VIGOROUS (19)	6 (31.5%)	12 (63.15%)	1 (5.26%)

Table 6. Vigorous versus Non-vigorous babies in different degrees of meconium stained liquor

MODE OF RESUSCITATION (n=19)	THIN (n=44)	THICK (n=35)	MODERATE (n=21)
STIMULATION (17)	5 (29.41%)	11 (64.7%)	1 (5.88%)
TRACHEAL SUCTIONING (14)	2 (14.28%)	11 (78.57%)	1 (7.1%)
PPV (13)	4 (30.76%)	8 (61.53%)	1 (7.69%)
CHEST COMPRESSION (6)	-	6	-
ADRENALINE (8)	-	8	-

Table 7. Neonatal resuscitation and degree of meconium staining

AUTHORS:

1. Uday Rajput
2. Anu Jain

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Pediatrics, Government Medical College and Hospital, Miraj.
2. Senior Resident, Department of Pediatrics, Government Medical College and Hospital, Miraj.

**NAME ADDRESS EMAIL ID OF THE
CORRESPONDING AUTHOR:**

Dr. Uday C. Rajput,
C/O, Dr. Mrs. Rajput,
Professor & Head,
Obstetrics and Gynaecology Department,
Wanless Mission Hospital, Miraj – 416410.
Email – drudayrajput@gmail.com

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