

Meconium Aspiration Syndrome

Subjects and Methods

145,623 neonates born at 18 centers of National Neonatal-Perinatal Database (NNPD) of India over two year duration (2002-2003)

Management of Meconium-stained amniotic fluid

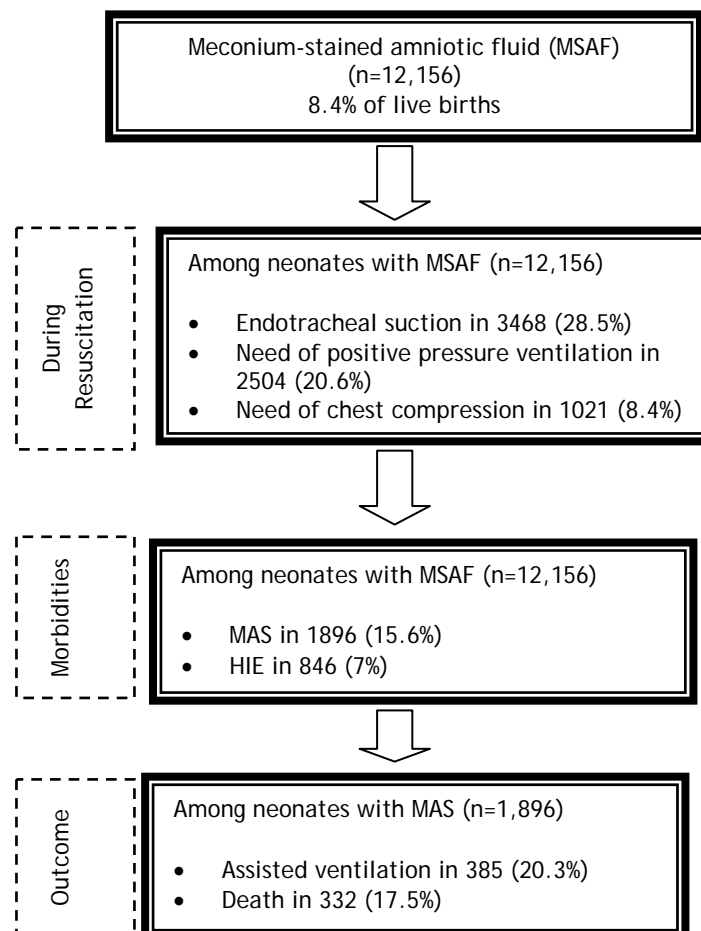
Contemporary recommendations of American Academy of Pediatrics and American Heart Association through Neonatal Resuscitation Program and Pediatric Working Group of International Liaison Committee on Resuscitation were expected to be followed. Management of a neonate born through MSAF comprised: 1) Suctioning the mouth, pharynx and nose as soon as head was delivered before delivery of shoulders (intrapartum suctioning) regardless of whether the meconium is thick or thin, and 2) if the infant was non-vigorous, intubating and suctioning the trachea before performing other steps of resuscitation.

Meconium aspiration syndrome

MAS was defined as presence of two of the following: meconium staining of liquor or staining of nails or umbilical cord or skin, respiratory distress within one hour of birth and radiological evidence of aspiration pneumonitis (atelectasis and/or hyperinflation).

Findings

Figure 1: Management and outcome of neonates born through meconium stained amniotic fluid



- Mean birth weight of babies born through MSAF was significantly lower (2646±552 gm vs. 2689±549 gm, p<0.00) and median gestation significantly higher (39 week, inter-quartile range: 38-40 weeks vs. 38 weeks; inter-quartile range: 37-40 weeks). Variables showing significant association with presence of MSAF were small-for gestation fetal growth status, pregnancy induced hypertension (PIH), eclampsia, prolonged rupture of membranes (>24 h), oligohydramnios, fetal bradycardia and fetal tachycardia (Table 1).

Table 1: Variables associated with presence of meconium stained amniotic fluid

Variable	MSAF (n=12,156)	No MSAF (n=133,467)	P value/ OR (95% CI)
Birth weight [®]	2646 (552)	2689 (549)	0.00
Gestation†	39 (38-40)	38 (37-40)	0.00
Male sex*	6,632 (54.6%)	70,402 (52.8%)	1.1 (1.0-1.1)
Post-term gestation*	200 (1.7%)	1165 (0.9%)	0.00
Small for gestation*	1566 (12.9%)	12,521(9.4%)	0.00
C-section*	5208 (42.8%)	36,512 (27.4%)	0.00
1 minute Apgar‡	8 (7-9)	8 (8-9)	0.00
5 minute Apgar‡	9 (8-9)	9 (9-9)	0.00
Pregnancy induced hypertension*	961 (7.9%)	8064 (6.0%)	1.3 (1.2-1.4)
Eclampsia*	177 (1.5%)	980 (0.7%)	2.0 (1.7-2.3)
Oligohydramnios*	360 (3.0%)	3018 (2.3%)	1.3 (1.2-1.5)
Prolonged rupture of membranes (>24h)*	586 (4.8%)	5267 (4.0%)	1.2 (1.1-1.3)
Fetal bradycardia (<120 bpm)*	1523 (12.5%)	3335 (2.5%)	5.6 (5.2-6.0)
Fetal tachycardia (>160 bpm)*	369 (3.0%)	931 (0.7%)	4.5 (3.9-5.0)

*Number (%), †Median (inter-quartile range), ®Mean (standard deviation)

- Among 3468 neonates who underwent tracheal suctioning (TS), 946 (27.3%) developed MAS as compared to 903 (10.4%) of 8,688 neonates who had MSAF, but did not undergo TS (odds ratio: 3.2, 95% CI: 2.9-3.6) (Table 2). This association between TS and development of MAS remained significant after applying multivariate logistic regression. Other variables significantly associated with MAS after regression analysis were fetal tachycardia and oligohydramnios.
- Apgar scores at 1, 5 and 10 minutes were significantly lower in neonates undergoing TS. Hypoxic ischemic encephalopathy developed in 588 (17%) neonates undergoing PTS and in 258 (3%) neonates born through MSAF but not undergoing TS (odds ratio: 6.7, 95% CI: 5.7-7.8). This association remained statistically significant after adjusting for possible confounding variables using multivariate logistic regression.
- Other outcomes significantly associated with TS were systemic sepsis (both early and late onset septicemia) and pneumonia. Neonates undergoing TS were two times more likely to receive antibiotics as compared to neonates not undergoing TS (52.3% vs. 24.6%).
- Death before discharge and a composite adverse outcome 'death or referral or leaving against medical advice' were significantly more common in babies undergoing TS. Among neonates born through MSAF and dying before discharge, perinatal asphyxia as single most common cause of death was observed in 40.5% cases (347/857). Perinatal asphyxia as single most common cause of death before discharge was observed in significantly higher proportion of neonates undergoing PTS (60.1% vs. 35.8%).

Table 2: Outcome of babies born through meconium stained amniotic fluid

Variable	Tracheal suctioning (n=3468)	No tracheal suctioning (n=8688)	P value/ OR (95% CI)
Meconium aspiration syndrome*	946 (27.3%)	903 (10.4%)	3.2 (2.9-3.6)
1 minute Apgart	6 (3-8)	8 (8-9)	0.00
5 minute Apgart	8 (6-9)	9 (9-9)	0.00
10 minute Apgart	9 (8-9)	9 (9-9)	0.00
Hypoxic-ischemic encephalopathy*	588 (17.0%)	258 (3.0%)	6.7 (5.7-7.8)
Septicemia*	274 (7.9%)	299 (3.4%)	2.6 (2.2-3.0)
Early onset sepsis*	222 (6.4%)	242 (2.8%)	2.5 (2.0-3.0)
Late onset sepsis*	69 (2.0%)	85 (1.0%)	2.1 (1.5-2.9)
Pneumonia*	152 (4.4%)	222 (2.6%)	1.7 (1.4-2.2)
Died*	401 (11.6%)	296 (3.4%)	3.8 (3.2-4.4)
Composite adverse outcome (Death or Referral or Left against medical advice)	496 (14.3%)	361 (4.2%)	3.8 (3.3-4.4)

Interpretation

- Proportion of births complicated by MSAF is comparable with reports from developed countries. However, proportion of MSAF-complicated births developing MAS is much higher (15.6% versus ~2-4%). High incidence of MAS may be due to 1) higher incidence of deliveries close to and after 40 weeks in developing countries, 2) more babies with chronic placental insufficiency, less placental reserve and therefore at higher risk of meconium passage during stress of labor, 3) delayed response to fetal distress, which leads to prolonged fetal gasping resulting in ante-partum aspiration of meconium, 4) inadequate immediate postpartum management of neonates born through MSAF.
- There is need of a large randomized controlled trial to study the roles of intrapartum nasopharyngeal and immediate postpartum tracheal suctioning in neonates born through MSAF in developing country setting.