Original Articles

DELIVERY ROOM MANAGEMENT OF INFANTS BORN THROUGH THIN MECONIUM STAINED LIQUOR

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ABSTRACT

A total of 3472 deliveries were studied over a year to evaluate (i) the importance of thin meconium stained liquor (MSL) in the causation of meconium aspiration syndrome (MAS), and (ii) the efficacy of intrapartum plus endotracheal suction at birth in the prevention of MAS due to thin meconium. Two hundred and ninety four (8.5%) of deliveries had meconium stained liquor of which thin MSL was present in 101. MAS occurred in 98 babies. Thin MSL was responsible for 19.4% of cases of MAS.

Inspite of intrapartum suction, a high proportion (55-78%) of infants had meconium in the trachea, though thin meconium was found in the trachea significantly less often than thick meconium. Combined intrapartum and endotrdcheal suction reduced the incidence of MAS due to thin meconium from 26% to 16%. MAS due to thin meconium occurred in asphyxiated as well as vigorous babies inspite of combined suction.

Thin meconium accounts for a significant proportion of deliveries with MSL and causes a considerable number of cases of MAS. To prevent meconium aspiration syndrome caused by thin meconium, all neonates born through thin MSL, whether they are asphyxiated or not should undergo intrapartum suction followed by immediate endotracheal suction at birth.

Key words: *Meconium, Meconium aspiration, Meconium stained amniotic fluid, Respiratory distress, Neonate.*

Meconium aspiration syndrome (MAS) is an important cause of respiratory morbidity in the newborn period. It can be prevented by oronasopharyngeal suctioning when the head is delivered, followed by immediate postnatal endotracheal suctioning(l-3). While this approach is of proven benefit with thick meconium stained liquor (MSL), it is not clear from the existing literature whether it should be routinely practiced even in deliveries with thin MSL. The present study was, therefore, conducted to evaluate: *(i)* the importance of thin MSL in the causation of MAS, and *(ii)* the efficacy of intrapartum suctioning and postnatal endotracheal suctioning in the prevention of MAS due to thin MSL.

Material and Methods

From 1st August 1992 to 30th July 1993 all deliveries with meconium-stained liquor were prospectively enrolled. In addition to the routine perinatal data, the consistency of meconium (thick or thin), color of meconium, presence of meconium staining of the cord/skin/nails/vernix, cord blood pH, occurrence of respiratory distress and neurological signs were recorded.

The following definitions were used:

(i) *Thin meconium:* Very light green staining of the amniotic fluid.

(ii) *Thick meconium:* Thick greenish

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meconium with paniculate matter in amniotic fluid.

(iii) Meconium aspiration syndrome (MAS): Development of respiratory distress soon after birth with radiological evidence of aspiration pneumonitis (atelectasis or hyperinflation) in the presence of meconium staining of the liquor or staining of nails or umbilical cord or skin.

The protocol for management of such deliveries with meconium-stained liquor consisted of:

1. Thorough intrapartum suctioning of the oropharynx and nose by the obstetrician on delivery of the baby's head.
2. Splinting of the chest by the nurse receiving the baby.
3. Immediate endotracheal intubation on the resuscitation table with a 3.0 or 3.5 mm endotracheal (ET) tube.
4. Sucking out meconium while withdrawing the ET tube, using mechanical suction.
5. Release of chest splinting.

Steps 3 and 4 were repeated if necessary till the trachea was clear. The heart rate and color of the baby were monitored during endotracheal suctioning.

Chi square test was used to test the statistical significance of the results.

Results

During the study period, of 3472 total deliveries, 294 (8.5%) of babies had meconium stained liquor. Eight cases had meconium of unknown consistency and were excluded from the final analysis. *Table I* shows the birthweight and gestation pattern of babies with thick and thin MSL.

TABLE I-*Characteristics of Babies with Thick and Thin MSL*

Characteristic	Thick MSL	Thin MSL
Number	185	101
Gestation (weeks) Mean±SD	38.41 ±2.13	37.80 ±2.27
Birth weight (g) Mean ± SD	2685 ± 536	2669 ± 637

Ninety eight babies had meconium aspiration syndrome. Out of the 101 babies with thin MSL, 19 developed MAS and of the 185 babies with thick MSL, 79 developed MAS (18.8% VJ 42.7%, $p < 0.001$). Thus, thin MSL caused 19 of 98 cases of MAS, *i.e.,* 19.4%.

One to three intubations were required per baby for tracheal suctioning. In the babies with thin MSL, intrapartum suction was not done in 30 babies and endotracheal suction could not be done in 24 babies.

Table II shows the frequency of intrapartum suction and of meconium in the trachea in the babies who underwent tracheal suction.

Table III shows the babies who underwent both intrapartum and endotracheal suction and compares the frequency of meconium in the trachea and of MAS with thick versus thin MSL.

Table TV shows the patterns of suction and the incidence of MAS in babies with thin MSL. The incidence of MAS was less in those who had both intrapartum and endotracheal suction than in those who had no suction.

Eighteen of the babies with thin MSL were asphyxiated. Of these, 4 developed MAS. Eighty three of the babies with thin

TABLE II— *Frequency of Intrapartum Suction and Meconium in the Trachea in Babies who Underwent Tracheal Suction*

Characteristic	Endotracheal suction		p
	Thick MSL	Thin MSL	
Number	168	77	
Intrapartum suction	122 (72.6%)	62 (80.5%)	>0.10
Meconium in trachea	135 (80.4%)	40 (51.9%)	<0.001

TABLE III -*Frequency of Meconium in the Trachea and of MAS in Babies who Underwent both Intrapartum and Endotracheal Suction*

Characteristic	Thick MSL	Thin MSL	p
Number	122	62	
Meconium in trachea	95 (77.9%)	34 <54.8%)	<0.01
MAS	43 (35.2%)	10 (16.1%)	<0.01

MSL were vigorous and 15 of these developed MAS. Fifty of the vigorous babies received intrapartum plus tracheal suction and of these 9 developed MAS.

Discussion

Optimal airway management of the neonate born through thin meconium-stained liquor (MSL) is not clear. Some authorities state that tracheal aspiration of thin meconium is not necessary(4). Others favor a selective approach, where tracheal suction is restricted to only babies with a one minute Apgar score of 6 or less(5). Such controversy exists because thin meconium has received less attention in the literature and has been less studied than thick meconium. Recently, the Committee on Neonatal Ventilation/Meconium/Chest Compression of the American Heart Association concluded that intratracheal suctioning may not be necessary & the meconium is thin, the obstetrician has suctioned the pharynx and the neonate is vigorous (all 3 criteria must be met)(6).

Our data reveals that one-third of all cases with meconium stained liquor had thin MSL. Thin MSL caused 19% of all cases of MAS. In other studies as many as 38 to 41% of neonates with MAS were born through thin MSL(7,8). Thus, thin MSL accounts for a considerable proportion of cases of MAS.

Meconium in the trachea was found in a significantly lesser number of infants with thin MSL than with thick MSL *(Table II).* This difference was not due to differences in intrapartum suctioning because the frequency of intrapartum suctioning was not significantly different in the two groups. We speculate that the thinner consistency of meconium may cause it to travel more rapidly than thick meconium into the distal

TABLE IV–*Pattern of Suctioning and Incidence of MAS with Thin MSL*

	IPS alone	ETS alone	Both	Neither	Total
n	9	15	62	15	101
MAS	1	4	10* (16.1%)	4* (26.7%)	19

IPS = Intrapartum suction, ETS = Endotracheal suction
* $p > 0.10$.

airways, thus making it less accessible on tracheal suction. Alternatively, it is possible that thin meconium is aspirated into the trachea less frequently than thick meconium.

Inspite of intrapartum suction, a high proportion (55-78%) of infants in both groups had meconium in the trachea *(Table III)*. This emphasizes the need for tracheal suction in all cases. Intrapartum suction alone should not be relied upon to prevent meconium aspiration.

The combined approach of intrapartum and endotracheal suction which is of proven efficacy in thick MSL appears to be useful even with thin MSL. Suctioned babies had a lesser incidence of MAS than non-suctioned babies *(Table IV),* though the difference did not reach statistical significance, probably due to the small numbers involved. A large randomized controlled study would be necessary to prove this point and such a study has begun at our institution. It must be recognized that even with proper suction the occurrence of MAS is not completely eliminated *(Tables III & IV). In utero* aspiration of meconium may be responsible for this.

Our data also questions the existing recommendations for the airway management of the neonate born through thin MSL(5,6) Fifty babies in our study had the 3 criteria (thin MSL, obstetric suction and vigorous baby) which supposedly make endotracheal suction unnecessary. Yet 9 of them developed MAS inspite of tracheal suction and conceivably the incidence of MAS in this group would have been higher if tracheal suction had not been done. Similarly, selecting only asphyxiated babies with thin MSL for tracheal suction would have been unwise because most (15 of 19) babies who developed MAS had no asphyxia.

Based on our data we recommended that all neonates born through thin MSL, whether they are asphyxiated or not should undergo intrapartum suctioning followed by endotracheal suctioning.

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