

Feeding problems with the first feed in neonates with meconium-stained amniotic fluid

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H Narchi, N Kulaylat. Feeding problems with the first feed in neonates with meconium-stained amniotic fluid. *Pediatr Child Health* 1999;4(5):327-330.

OBJECTIVE: To compare the incidence of feeding problems at the first feed between neonates born with meconium-stained amniotic fluid (MSAF) and those born without MSAF.

DESIGN: A prospective observational study conducted over a one-year period.

SETTING: A level 2 neonatal unit.

POPULATION STUDIED: A total of 2828 neonates were studied, including 275 neonates with MSAF. All neonates were born after more than 34 weeks of gestation, and had no birth asphyxia, hemodynamic, respiratory distress or major congenital anomalies. The neonates were offered a feed within 1 h of birth, and the incidence of early feeding problems (ie, retching, vomiting, slow feeding or poor suck) was studied.

RESULTS: Feeding problems at the first feed developed in 55 infants (13 of 275 with MSAF and 42 of 2533 without MSAF). Feeding problems were more common in infants with MSAF ($P=0.001$, relative risk=2.8, 95% CI 1.45 to 5.63), regardless of the type of MSAF (thin or thick). Although fetal distress was more frequent in the MSAF group, there were no differences in the 1 and 5 min Apgar scores whether meconium was present. Maternal sedation was not found to be a contributing factor. The mechanical and chemical actions of meconium inside the stomach requires further study.

CONCLUSION: Feeding problems at the first feed are 2.8 times more frequent in neonates born with MSAF, regardless of the consistency of the amniotic fluid. Mothers of such infants need to be informed and supported during feeding to minimize discouragement. The demands on the nursing staff must be anticipated accordingly.

Key Words: Feeding problems; Meconium-stained amniotic fluid; Neonatology

Les problèmes d'alimentation au premier boire des nouveau-nés dont le liquide amniotique était teinté de méconium

OBJECTIF : Comparer l'incidence de troubles d'alimentation au premier boire entre les nouveau-nés dont le liquide amniotique était teinté de méconium (LATM) et les autres nouveau-nés.

MÉTHODOLOGIE : Étude prospective par observation réalisée sur une période d'un an.

LIEU : Unité de néonatalogie de niveau 2

POPULATION ÉTUDIÉE : Au total, 2 828 nouveau-nés ont été étudiés, dont 275 au LATM. Tous les nourrissons sont nés à plus de 34 semaines d'âge gestationnel, et aucun n'a souffert d'asphyxie, de trouble hémodynamique ou de détresse respiratoire à la naissance et n'a présenté d'anomalie congénitale grave. Les nouveau-nés ont reçu un boire dans l'heure suivant leur naissance, et l'incidence de troubles d'alimentation (p. ex., haut-le-cœur, vomissements, alimentation lente ou mauvaise succion) a été étudiée.

RÉSULTATS : Des troubles d'alimentation au premier boire ont été observés chez 55 nourrissons (13 sur 275 au LATM et 42 sur 2 533 sans LATM). Ces troubles étaient plus courants chez les nourrissons au LATM ($P = 0,001$, risque relatif = 2,8, IC 95 %, 1,45 à 5,63), quel que soit le type de LATM (liquide ou épais). Bien que la souffrance fœtale ait été plus fréquente au sein du groupe au LATM, l'Apgar n'a pas changé à une minute et à cinq minutes en présence de méconium. La sédation maternelle ne constituait pas un facteur contributif. Les actions mécaniques et chimiques du méconium dans l'estomac exigent des études plus approfondies.

CONCLUSION : Les problèmes d'alimentation au premier boire sont 2,8 fois plus élevés chez les nouveau-nés au LATM, quelle que soit la consistance du liquide amniotique. Il convient d'informer et de soutenir les mères de ces nourrissons pendant l'allaitement, afin de réduire leur découragement au minimum. Il faut prévoir en conséquence l'augmentation de la charge de travail du personnel infirmier.

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Meconium staining of the amniotic fluid occurs in up to 10% of deliveries (1). While its association with hypoxic and ischemic insult to the fetus, and its role in meconium aspiration syndrome are well described, little is known about the mechanical or chemical effects of swallowed meconium on the stomach of the newborn. The presence of meconium in the stomach may act as a chemical irritant that interferes with gastric function, and causes undigested milk curds and feeding problems.

We undertook this study to analyze whether problems during the first feeding were more frequent in neonates with meconium-stained amniotic fluid (MSAF).

PATIENTS AND METHODS

A prospective observational study was conducted over a one-year period in a level 2 neonatal unit. MSAF was defined as thick when it was turbid, viscous or contained particulate matter; otherwise, it was defined as thin.

At the institution, all neonates with MSAF have oronasopharyngeal suction performed as soon as the head is delivered. Immediately after birth, tracheal suction is performed by a paediatrician if thick is present and there are signs of birth asphyxia. Tracheal suction is not performed if the meconium is thin and the infant is vigorous at birth. Gastric contents are not suctioned.

Regardless of the mother's gravidity, all neonates are offered a feed (breast feeding or formula) within 1 hr of birth, unless one of the following conditions is present: birth asphyxia requiring resuscitative measures exceeding suction and bagging for more than 2 mins, hemodynamic instability (ie, poor capillary refill, tachycardia and blood pressure below two standard deviations of the mean for the gestational age), respiratory distress, and obvious major congenital anomalies requiring evaluation or surgery soon after birth (eg, abdominal wall defects or diaphragmatic hernia). Because infants born before 34 weeks of gestation may not feed well due to their prematurity, they were not included in the study.

Only the first feed offered after birth was studied because the physical and chemical characteristics of meconium in the stomach are more likely to affect the first feed than subsequent ones, if they have a significant role to play. The first feed was given either by the mother with the neonatal nurse caring for the infant in attendance or by the neonatal nurse if the mother was unable to feed. Feeding data were collected by the neonatal nurses who entered them on a data sheet designed for this study. The maternal and neonatal delivery documentation were not available to the neonatal nursing staff caring for the infants. The nurses were not informed about the purpose of the study and, because the infants were cleaned in the labour ward before being transferred to the neonatal nursery for the first feed, they were also unaware of whether meconium was present at delivery. Feeding problems were said to occur at the first feed if retching or vomiting were observed, feeding was very slow or the suck was poor. The feeding was qualified as poor or slow when the

baby was not heard to swallow after every one to two sucks and when the suck-swallow pattern did not last for more than 10 mins. The suck was judged to be weak when the baby appeared to be merely mouthing the nipple without regular swallowing or when no sucking effort was noted (2). Because no alteration in the care of neonates took place during the study and the procedures were routine as per the unit policy, informed consent was not judged to be necessary.

Statistical analysis of the results was carried out by the Student's *t* test to compare two means, and χ^2 and the Fisher's exact test were used for comparing proportions. When indicated, relative risk (RR) was calculated with 95% CI.

RESULTS

Over the 12 months, 2987 neonates who met the inclusion criteria were identified, including 282 infants (9.4%) with MSAF. MSAF was thin in 200 (71%) neonates and thick in 82 (29%) neonates. Seven infants had meconium aspiration syndrome (2.5% of infants with MSAF and 0.2% of all deliveries).

One hundred fifty-nine neonates were excluded from the study, including seven infants with MSAF, who were not fed early (101 had respiratory distress of varying etiologies, seven had meconium aspiration and thick MSAF, 10 had birth asphyxia and 41 were below 34 weeks' gestational age).

A total of 2828 neonates were studied, including 275 neonates with MSAF. All infants were offered a feed after birth; 75% were breastfed. Feeding problems at the first feed occurred in 55 infants (1.9%), including 13 (23.6%) neonates with MSAF (eight [61.5%] thin and five [28.5%] thick), and 42 without MSAF. Significantly more infants with MSAF had initial feeding problems (4.7%) compared with those born without MSAF (1.6%) ($P=0.001$, $RR=2.8$, 95% CI 1.45 to 5.63).

The characteristics of all neonates with initial feeding problems are detailed in Table 1. There were no differences in the sex, mode of delivery, breast or bottle feeding, poor sucking reflex, vomiting, need for intravenous fluids between infants with MSAF and those without MSAF ($P>0.05$). Of the 55 babies who were feeding poorly, those born with MSAF were significantly more likely to weigh more, have a more advanced gestational age and experience more retching. Although maternal opiate analgesia administration within 4 h of delivery was more common in the MSAF group, there was no difference in the requirement for naloxone administration between both groups ($P>0.05$). Although fetal distress was more common in the MSAF group, there were no differences in 1 and 5 min Apgar scores between both groups, nor in the need for resuscitation ($P>0.05$); as stated earlier, infants with birth asphyxia were excluded from the study. All 55 neonates subsequently tolerated oral feeds well at a mean age of 9 h (standard deviation=7) in those with MSAF and 13 h (standard deviation=14) in those without; the difference was not significant ($P=0.42$).

TABLE 1: Characteristics of neonates with and without meconium-stained amniotic fluid (MSAF) who experienced feeding problems at the first feed

	Without MSAF	With MSAF	P
Neonates with feeding problems (total number of neonates)	42 (2553)	13 (275)	0.001*
Females/Males	14/28	3/10	0.36 [†]
Maternal opiate analgesia during labour	1	5	0.001 [†]
Fetal distress	1	3	0.03 [†]
Mean birth weight (\pm SD) (g)	3060 (\pm 586)	3680 (\pm 593)	0.002 [‡]
Mean gestational age (\pm SD) (weeks)	38.8 (\pm 2)	40 (\pm 0.7)	0.02 [‡]
Number of neonates with 1 min Apgar score less than 7	12	2	0.28 [†]
Number of neonates with 5 min Apgar score less than 7	2	1	0.5 [†]
Poor suck	31	11	0.34 [†]
Retching	27	12	0.04 [†]
Vomiting	26	9	0.44 [†]
Abdominal distention	7	1	0.38 [†]
Gastric feeding	6	0	0.18 [†]
Intravenous fluids needed	18	3	0.17 [†]
Mean age (\pm SD) (hours) when feeds tolerated	13 (\pm 7)	9 (\pm 14)	0.42 [‡]

* χ^2 ; [†]Fisher's exact test; [‡]Student's *t* test. SD Standard deviation

TABLE 2: Characteristics of all neonates with meconium-stained amniotic fluid (MSAF)

	Thin	Thick	P
Neonates with MSAF	200	75	
Neonates with MSAF with feeding problems	8	5	0.3*
Females/Males	2/6	1/4	0.4*
Maternal opiate analgesia during labour	2	3	0.12*
Fetal distress	1	2	0.18*
Mean birth weight (\pm SD) (g)	3886 (\pm 615)	3348 (\pm 405)	0.1 [†]
Mean gestational age (\pm SD) (weeks)	40.5 (\pm 0.75)	39.8 (\pm 0.44)	0.08 [†]
Number of neonates with 1 min Apgar score less than 7	0	2	0.08*
Number of neonates with 5 min Apgar score less than 7	0	1	0.27*
Poor suck	7	4	0.5*
Retching	7	5	0.3*
Vomiting	6	3	0.7*
Abdominal distention	1	0	0.7*
Gastric feeding	0	0	NA
Intravenous fluids needed	1	2	0.2*

*Fisher's exact test; [†]Student's *t* test. SD Standard deviation; NA Not applicable

Table 2 describes the 275 neonates born with MSAF according to fluid characteristics (thin or thick). No significant differences were found in sex, gestational age, birth weight, mode of delivery, fetal distress, 1 and 5 min Apgar scores or feeding problems, and no significant difference was found in the need for tube feeding or intravenous fluids between the two types of MSAF ($P > 0.05$).

DISCUSSION

MSAF occurred in 9.4% of all deliveries; the results are similar to other studies (1). MSAF was thick in less than one-third of cases.

We found feeding problems at the first feed to be more

common in neonates with MSAF (RR=2.8). Although we used objective markers to assess the quality of feeding in this study, we recognize that the observations may have been subjective and that it may be difficult to compare the feeding performance of infants who were breastfed or bottle fed because there may be differences in the effort made by the infants in sucking and swallowing from the breast or from the formula bottle, and in the volume of the first feed. Although fetal hypoxia, which may lead to intrauterine passage of meconium, could itself lead to poor suck and swallow, it is an unlikely factor because there were no differences in the 1 and 5 min Apgar scores in poorly feeding neonates whether meconium was present, and in-

fants with birth asphyxia were excluded from the study. Because maternal sedation within 4 h of delivery was more commonly associated with poor feeding in infants with MSAF, it could also be considered an independent factor. However, this is unlikely because no infants required naloxone and, while retching was common, poor sucking effort (commonly associated with sedated babies) did not occur more frequently in infants with MSAF. The mechanical and chemical actions of meconium inside the stomach should be studied further. The characteristics of MSAF (thin or thick) did not predict the incidence of feeding problems at the newborn's first feed.

The mothers of MSAF neonates should be informed about the possibility of early feeding problems to minimize their discouragement when feeding the infant. The

support required by the mother and the feeding assistance provided by the nursing staff need to be anticipated accordingly.

ACKNOWLEDGEMENTS: The authors thank the neonatal nursing staff for participating in the data collection and acknowledge the use of Saudi Aramco Medical Services Organization facilities for the study. The authors were employed by Saudi Aramco during the time that the study was conducted and this paper was written.

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IMPACT HIGHLIGHTS

Meningitis caused by penicillin-resistant pneumococci: A growing concern

Clinicians should be aware that meningitis cases caused by penicillin-resistant pneumococci are no longer rare in Canada. The Immunization Monitoring Program, ACTive (IMPACT) network has recorded 26 such cases since 1991, involving six of 11 participating centres. Initially, only one to two cases were seen annually, but a dozen cases were encountered from January 1997 to December 1998. One case was fatal, involving a previously healthy one-year-old girl. Only two cases to December 1998 involved strains highly resistant to penicillin (and often to other important antibiotics), but such cases are likely to become more frequent as the prevalence of such isolates increases among children. Clinicians should consider the possibility of penicillin-resistant pneumococci when selecting empirical antibiotic treatment for children with meningitis.

Submitted from the IMPACT Data Center, Vancouver, British Columbia

IMPACT (Immunization Monitoring Program, ACTive) is a program of the Canadian Paediatric Society and Health Canada's Laboratory Centre for Disease Control that monitors vaccine-associated adverse events, vaccine failures, and selected infections in children that are, or are soon to be, preventable by vaccines