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Gastric lavage and enteral feeding problems in late preterm and term neonates born with meconium-stained amniotic fluid: A observational study.

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Abstract

Introduction: Gastric lavage has long been advocated as a regular part of the standard of care for meconium staining of amniotic fluid (MSAF) infants. It is believed that meconium in the stomach acts as an irritant and triggers vomiting and retching. Interestingly, this advice is also given in several textbooks without any justification. Prenatal issues such as pregnancy-induced hypertension, antepartum toxemia, obstructed or delayed labor, and fetal discomfort are common in MSAF-positive pregnancies. In the early neonatal period, a proportion of infants born through meconium-stained amniotic fluid may swallow meconium and have nausea, vomiting, retching, various feeding issues such as poor sucking, and subsequent aspiration after vomiting. We conducted this observational study to determine whether stomach washing decreases the requirement for subsequent stomach washing in neonates born via MSAF soon after delivery, as indicated by feed intolerance.

Methods: An observational study was performed on newborns diagnosed with meconium-stained liquor for six months in a single tertiary care level III neonatal intensive care unit.

Results: Of 1103 neonates, 110 (9.9%) were born with MSAF during the study period. Eight (8%) infants required additional stomach washing within the first 48 hours of life. Eighteen infants (18.0%) experienced at least one episode of vomiting. Only 8 of them needed further gastric lavage to resume eating. Five out of one hundred infants (5/100) had regurgitation (more than one episode). No newborns required parental fluids in the first 48 hours. Baseline parameters such as gestational age, birth weight, sex, mode of delivery, Apgar score at 1 and 5 minutes, and meconium consistency were observed.

Conclusions: Gastric lavage has been frequently performed as part of crucial newborn care for infants with meconium-containing amniotic fluid. According to the findings of this study, gastric lavage should be reserved for treating the relatively uncommon occurrence of feed intolerance in neonates born with meconium-stained liquor (MSL) rather than being used as a routine prophylactic measure.

Keywords: **MeSH**: "Amniotic Fluid," "Gastric Lavage", "Méconium", "Observational Study", "Staining and Labeling".

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Introduction

For a long time, meconium staining of amniotic fluid (MSAF) was thought to be a poor predictor of fetal fate. Meconium-stained amniotic fluid is seen in 8% to 15% of pregnancies [1, 2]. Prenatal issues such as pregnancy-induced hypertension, antepartum toxemia, obstructed or delayed labor, and fetal discomfort are common in MSAF-positive pregnancies. In the early neonatal period, a proportion of infants born through meconium-stained amniotic fluid may swallow meconium and have nausea, vomiting, retching, various feeding issues such as poor sucking, and subsequent aspiration after vomiting [3, 4]. In the stomach, meconium is a chemical irritant that interferes with gastric function, resulting in undigested milk curds and feeding difficulties [5]. Gastric lavage after delivery may help to lower the likelihood of these problems. Keeping this in mind, many neonatal facilities have a policy of performing routine stomach lavage on these newborns shortly after birth. A recent computerized poll discovered that one-third of the country's 12 primary level III neonatal hospitals adhere to this guideline through personnel communication [6]. Unfortunately, there is not much evidence to support either side of the debate. Routine gastric lavage was found to have no meaningful benefit in the single study, a quasirandomized trial.

As a response, the purpose of this observational study was to determine the effect of gastric lavage on the initiation and tolerance of feeding in the first two days of life in term and near-term infants born through MSAF and whether stomach washing decreases the requirement for subsequent stomach washing in neonates born via MSAF soon after delivery, as indicated by feed intolerance.

Materials and methods

Type of study

This is an observational study with a retrospective and prospective study design of six months, in which 100 based on sample size calculation was taken.

Scenery

The study was carried out in the Department of Pediatrics of the Dr. Vasantrao Pawar Medical College and Research Hospital, Nashik, Maharashtra, India. The study period was from June 1, 2022, to December 31, 2022.

Participants

Newborns with a gestational age of more than 36 weeks with the following conditions were included: full-term newborns with a gestational age of more than 36 weeks were taken as study subjects with eligibility criteria of age-eligible for the study up to 1 hour, both sexes, meconium staining of amniotic fluid, and vigorous babies. Outcome measures in the form of feeding problems [time frame: until first two days of life] [designated as safety issue: no] were considered. Feeding problems were considered present if a. mother or caretaker gave a history of retching, vomiting, or both; b. nursing staff or resident on duty observed vomiting. Healthy, vigorous newborns with no history of meconium staining of amniotic fluid, a 5-minute Apgar score of <5, significant congenital anomalies, hemodynamic instability, and respiratory distress requiring immediate admission to the intensive care unit were excluded.

Variables

The study variables included demographic baseline characteristics, types of feeding problems, need for additional stomach washing, requirement for parental fluids in the first 48 hours, and duration of hospital stay.

Data sources/measurements

The source was direct; the study was conducted in the NICU of a level III tertiary care unit. The information was confidential; no personal data were included to identify the study subjects.

Biases

The principal investigator kept the data with a guide and records approved in the research protocol to avoid possible interviewer, information, and memory biases. Observation and selection bias was avoided by applying the participant selection criteria. All the clinical and paraclinical variables of the period above were recorded. Two researchers independently analyzed each record in duplicate, and the variables were recorded in the database once their concordance was verified.

Study size

The sample was probabilistic, with a confidence level of 95% and a 5% margin of error; the sample size was 1103 babies.

Quantitative variables

Descriptive statistics were used. The results were expressed on a scale of means and standard deviations. Categorical data are presented in proportions.

Statistical analysis

Patient information was collected in a proforma. Data entry was performed using Epi-info v3.3.2. Analysis was performed using state 9.1 (College Station, Texas, US). Baseline categorical variables were compared between the groups using the chi-square/Fisher's exact test. Baseline categorical variables were compared between the groups using Chi-square/Fisher's actual test. The statistical package used was SPSS 23.0 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp).

Results

During the study period, 110 (or 9.9%) of the 1103 newborns delivered throughout the research period had MSAF. It was thin in 78 (71%) patients and thick in 32 (29%) patients. Three infants with meconium aspiration syndrome (2.7% of all MSAF and 0.27% of all deliveries) were excluded from the study.

A total of 110 infants with MSAF were born; 3 had meconium aspiration syndrome, 4 had respiratory distress that required oxygen, and 3 had congenital malformations and were excluded; the remaining 100 infants were submitted to routine gastric lavage after birth. The procedure was well tolerated in all patients. No apnea, secondary vomiting with aspiration, later feeding difficulties, or secondary pulmonary aspiration of meconium-containing gastric fluid were observed.

Routine/common characteristics such as gestational age, sex, birth weight, delivery mode, and meconium consistency were documented (Table 1).

Feeding problems were documented in the form of vomiting, age at the initial vomiting episode, need for subsequent stomach wash, etc., as shown in Table 2.

Feeding intolerance developed in 8 infants who required subsequent stomach washing.

1. Need for additional stomach washing: Eight (8%) infants required other stomach washing within the first 48 hours of life. Infants needed stomach washes on average nine hours old (the range was four to twenty-four hours).

Table 1. Demographic and baseline characteristics

Variable	
Birth weight, g, mean (SD)	3029 (357)
Gestation, weeks, median (IQR)	39.1 (1.5)
Gender,	
Male, n (%)	55 (55)
Female, n (%)	45 (45)
Mode of delivery	
`Vaginal, n (%)	20 (20)
LSCS, n (%)	80 (80)
Thick MSAF, n (%)	27 (27)
Median Apgar score at 5 minutes (IQR)	8 (7 – 9)

*SD – Standard Deviation, IQR – Inter quartile range, n – population selected, MSAF – Meconium stained amniotic fluid, % - percentage.

Table 2. Feeding problems.

Variable	%
Vomiting (at least one episode)	18 (18%)
Age at initial vomiting episode (hr)(median, range)	13 (5, 22)
Need for subsequent stomach wash in infant born through MSL	8 (8%)
Age at stomach wash (hr) (median, range)	9 (4, 24)
Regurgitation (2 or more episodes)	5 (5%)
Nausea and/or retching	7 (7%)

*hr – Hour, MSL – Meconium stained liquor

2. Vomiting: In the first 48 hours of life, 18 infants (18.0%) experienced at least one episode of vomiting. Only 8 of them needed further gastric lavage to resume eating.

The first bout of vomiting occurred at a median age of 14 (9–23) hours.

3. Regurgitation and nausea/retching: Five out of one hundred infants (5/100) had regurgitation (more than one episode) (Table 2).

Similarly, 7/100 newborns had nausea or retching (Table 2).

4. Requirement for parental fluids in the first 48 hours: No newborns in the group had this need in the first two days of life.

Table 3. Incidence of feeding problems comparison to different studies.

	Gastric lavage group Group A	Non gastric lavage group Group B	*P* value
Jatin Garg et al. [10]	9.7%	13.7%	*P* > 0.05
Preeti Sharma et al. [11]	6.74%	10.78%	P = 0.63
Kumud babu singh et al.[12]	12.5%	13.5%	P = 0.86
H. Narchi & N. Kulaylat et al.[13]	0%	5%	Not significant
Lokraj Shah et al.[14]	8.7%	11.5%	Not significant
Gidaganti S et al.[21]	1.4%	2.2%	Not significant

Discussion

Despite the lack of proper research, our observation offers insight into this widely recommended and accepted behavior. A total of 8% to 15% of all babies experienced MSAF, consistent with other studies [7]. The MSAF was thick a little under a third of the time. Gastric lavage is still a standard neonatal treatment in India and is also recognized in neonatal protocols from other countries [8, 9]. The stomach's chemistry is thought to be disturbed by meconium, which leads to gastritis and subsequent meconium aspiration syndrome when the stomach's contents are regurgitated. It was, therefore, appropriate to perform gastric lavage to reduce feed resistance and increase breastfeeding success during the first few hours of life.

Our observational study demonstrated that the incidence of FI in babies who underwent gastric lavage soon after birth was 8%. This incidence was comparable to a randomized control trial conducted by Jatin et al. that indicated no significant difference in feed intolerance between groups receiving gastric lavage (group A) and those receiving no gastric lavage (group B). The incidence of FI was 9.7% in Group A compared to 13.72% in Group B (*P* > 0.05), which was comparable with other studies [10]. Different studies (Table 3) showed similar results.

This statistically insignificant difference in these studies can be explained by the hypothesis proposed by Sharma et al. that vigorous neonates have reduced exposure to meconium in utero compared to nonvigorous babies. Early postnatal eating further dilutes the meconium and its irritating characteristics [11].

Our study's primary outcome variable (need for a subsequent stomach wash) was chosen for two reasons: (1) there is no universally accepted definition of "feed intolerance," especially in term and near-term neonates, and (2) it is challenging to record the outcome, such as regurgitation and nausea/retching. Since infants born through meconium-stained liquor and who develop vomiting or recurrent episodes of regurgitation in the first two days of life are routinely managed with stomach wash in our unit, we decided to use this as the primary outcome of our study. To eliminate subjectivity in determining the need for stomach washing, we standardized the existing protocol and ensured that it was strictly adhered to throughout the study.

Outcomes such as the frequency of vomiting in the first two days of life, regurgitation, nausea, and retching were detected and compared to other studies. Even after gastric lavage, there were 18% cases of vomiting in our study. This was analogous to research by Kumud Babu Singh et al., who found a statistically insignificant 12.2% incidence of vomiting in the group that did not receive gastric lavage and a 19.4% incidence in the group that did [12].

None of the infants needed parenteral fluid. No infant in the study also acquired meconium aspiration syndrome, which makes sense given that they were alert, able to move about at birth, and did not need any resuscitation techniques. No significant side effects, such as apnea or bradycardia, were found in the infants with gastric lavage. Cuello et al. did not report Baby problems related to gastric lavage

[15] or V. R. Viraraghavan et al. [16]. However, Widstrom et al. [17] found that neonates born through clear liquor who had undergone stomach suction experienced a slight increase in mean arterial blood pressure, increased retching, and an interrupted sequence of prefeeding behavior. The researchers found that although the physiological side effects of stomach suction are mild, the newborns seem to find them unpleasant. We were unable to evaluate these implications. We, in

general, indicate that universal gastric lavage has no significance in the outcome of meconium-stained babies.

We also did not see any negative consequences in our study population, such as respiratory failure, as reported by R. Ballard et al. [18], or neonatal depression after birth, as written by M. Levene et al. [19], but it was similar to those reported by Deshmukh M et al. [20] and Gidaganti S et al. [21]

Our study's merits include (a) addressing a prevalent clinical question for which there is scant information and (b) having a sizeable sample. The major limitation of our study was that it relied heavily on moms to provide information regarding outcomes such as vomiting and regurgitation, which made it subject to subjectivity. Furthermore, it was assumed that 30% of newborns would need a repeat stomach wash when determining the sample size. Given that only 8% of these children required treatment, the study's power could be higher. On the other hand, one could argue that such a low rate does not justify a "regular" invasive surgery such as gastric lavage.

To summarize, performing a routine stomach wash shortly after birth in strong-term and late preterm newborns did not lessen the need for further stomach wash in the first 48 hours of life and is not advised as a standard procedure. In this study, various imaging techniques can be advocated to prevent this invasive procedure in the future.

Conclusions

During the management of neonates with meconium aspiration, gastric lavage has been mentioned as part of crucial newborn care. However, this study found that feeding issues are not common in neonates with meconium-stained liquor (MSL) and that frequent preventive gastric lavage has no effect in reducing the occurrence of MSL. This may save equipment, nursing time, clinical attention, and procedure-related problems in resource-constrained environments. Gastric lavage should be retained to address the relatively unusual occurrence of feed intolerance in neonates born with MSL rather than being conducted on a regular preventive basis, according to the findings of this study.

Abbreviations

MSL: meconium-stained liquor.

Supplementary information

No supplementary materials are declared.

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Author contributions

Prashant Bhadane: Conceptualization, data curation, formal analysis, fundraising, research, writing - original draft, methodology, project administration, resources, software, supervision, validation, visualization, writing - revision and edition.

The authors have read and approved the final version of the manuscript.

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Availability of data and materials

Due to the confidentiality of medical records, the data are not available to the general public and can be shared upon reasonable academic request.

Statements

Ethics committee approval and consent to participate

Not required for observational studies.

Publication Consent

Not required when patient-specific images, radiographs, and studies are not published.

Conflicts of interest

The authors declare they have no conflicts of interest.

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