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Original Article

Delayed meconium passage and feed intolerance in neonates with birth weight <1250 g

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ABSTRACT

Background: Optimal feeding strategy in preterm neonates is unclear. These neonates are at high risk of feed intolerance (FI) and necrotizing enterocolitis (NEC). Considering this risk, introduction of enteral feeding in these neonates is usually delayed. Delayed passage of meconium has been considered as risk factor for FI. We planned this study with an objective to compare incidence of FI and NEC in neonates who passed meconium early vs those who had delayed passage of meconium.

Methods: Data of all neonates <1250 g birth weight (BW) admitted between a period of January 2011 and December 2014 were retrieved from the case records. Demographic details, stooling pattern, and neonatal outcomes including FI, NEC, sepsis and mortality, and time to full feed were noted. Neonates were categorized in two groups based on timing of first meconium: those who passed meconium within 48 hours, “early meconium” and those passed meconium after 48 hours, “delayed meconium”. Outcomes in two groups were compared.

Results: Incidence of FI was 32.5% in early meconium group vs 57.1% in delayed meconium group, adjusted OR (95% CI): 0.37 (0.18, 0.75). Neonates in early meconium group had lesser duration of IV alimentation and reached full enteral feed (180 ml/kg/day) earlier. Incidence of NEC, sepsis, and mortality was comparable.

Conclusion: Early passage of meconium is associated with better feed tolerance, reduced duration of IV alimentation, and earlier establishment of full enteral feed in preterm neonates. Large randomized trials are warranted to evaluate impact of facilitated/scheduled evacuation of meconium on outcomes of preterm neonates.

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1. Introduction

Providing adequate nutrition is essential for the optimal growth and development of very preterm neonates. Usually,

these neonates receive a combination of enteral and parenteral nutrition (PN). Early establishment of enteral feeding is desirable due to complications associated with prolonged parenteral alimentation.^{1,2} However, these neonates are at high risk of feed intolerance (FI) and necrotizing enterocolitis

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(NEC) and initiation of enteral feeds is often delayed with gradual increments.³ Gut immaturity and poor intestinal motility are the commonly cited reasons for FI in very preterm infants.⁴ This often results in frequent interruption of enteral feeds, resulting in prolonged time taken to reach full enteral feeds.⁵

Passage of meconium is often delayed in preterm compared with term neonates and even more in very premature infants.⁶ Few observational studies suggest an inverse correlation between a delay in meconium evacuation and feeding tolerance.⁷ Early passage of meconium has been shown to be associated with better feed tolerance in extremely low BW infants.^{8,9} However, evidence for this association of early stooling in preterm neonates with better feed tolerance is inconclusive. We planned this study to evaluate association of early stooling pattern in preterm neonates with FI and NEC.

2. Methods

We conducted this observational study between a period of January 2011 and December 2014 in neonates admitted to a tertiary care neonatal unit at northern India. Data was retrieved from case records of all neonates with BW <1250 g. Neonates who were admitted to NICU after 48 hours of life, or those who expired before initiation of enteral feeds, those with major congenital malformation, or severe perinatal asphyxia (5 min apgar <3) were excluded.

Neonates were managed as per standard clinical practice guidelines. Early enteral feeding was initiated in neonates who were hemodynamically stable, without any inotropic support. After initial stabilization, the neonates with BW >1000 g and gestational age (GA) >30 weeks were initiated on exclusive enteral feeds (80 ml/kg); neonates with GA ≤30 weeks and BW ≤1000 g were initiated on 10–20 ml/kg feeds, along with PN. Subsequently, feeds were advanced as tolerated, with daily increment of 10–30 ml/kg to a maximum 180 ml/kg/day.

Neonates were routinely monitored for signs of FI by examination of abdomen and prefeed abdominal girth (AG) measurement. Gastric aspirate was done if abdomen was tense/tender or girth increased by >2 cm. FI was defined as abdominal wall erythema or tenderness; or an increase in AG by ≥2 cm with bilious/hemorrhagic aspirates or volume of gastric residue >50% of feed aliquot. In neonates with evidence of FI, feed was withheld for at least 24 hours or till above signs resolved. NEC was defined and classified as per modified Bell's staging.

2.1. Data collection and statistical analysis

Data was collected in a predesigned proforma in MS excel. Demographic characteristics, time to first stool, time to reach full feed (180 ml/kg), and episodes of FI were recorded. The study population was divided into two groups based on timing of first meconium passage ("Early meconium", within 48 hours; and "Delayed meconium", after 48 hours). Statistical analysis was done using SPSS, version 17. Continuous variables are presented as mean (SD) and categorical variables are presented as proportions. To evaluate association between delayed meconium passage and FI, logistic regression analysis was done and odds ratio and their 95% confidence interval (CI) were computed. To adjust for confounders (BW, gestation, SGA status, and abnormal umbilical Doppler) adjusted Odds ratio and 95% CI were computed. Kaplan Meier survival analysis was done to compare duration of IV alimentation and time taken to reach full enteral feeds (180 ml/kg/day).

3. Results

During study period, 349 neonates with BW <1250 g were admitted to NICU. Of these, 113 neonates were excluded, 58 of which expired before initiation of enteral feeds, 54 neonates were admitted after 48 hour of life, and 1 had gastrointestinal malformation. Remaining 236 neonates were enrolled in study and analyzed. Mean (SD) BW and GA of enrolled neonates were 991 (117) g and 29 (2.6) weeks, respectively. Eighty-eight (37.4%) neonates were small for GA (SGA). One hundred and ninety-four neonates passed first meconium within 48 hours of life, and 42 neonates passed meconium after 48 hours of life. Baseline characteristics of two groups are presented in Table 1. Neonates who had delayed passage of meconium had lower BW and GA; fewer neonates in this group were SGA.

Overall incidence of FI among study participants was 37.7%. Feeding outcomes of two groups are displayed in Table 2. Incidence of FI was 32.5% in "early meconium" group vs 57.1% in "delayed meconium" group; $p < 0.01$; after adjusting for potential confounders (BW, GA, SGA, abnormal Doppler), incidence of FI remained significantly less in neonates, who passed meconium early. Difference in NEC remained insignificant. Incidence of sepsis and mortality was comparable in two groups. Fig. 1 displays Kaplan Meier survival curve of time to reach full feeds in two groups. Median time (95% CI) to reach full feed was 10 (6, 14) and 13 (9, 23) days, in early and delayed meconium group,

Table 1 – Baseline characteristics in neonates who passed meconium within or after 48 hours.

Characteristics	Early meconium (N = 194)	Delayed meconium (N = 42)	p Value
Birth weight (g), mean (SD)	1008 (167)	942 (178)	0.02
Gestational age (week), mean (SD)	29.6 (2.5)	28.5 (2.5)	0.01
Male gender, n (%)	108 (55.7)	21 (50)	0.50
Small for gestational age, n (%)	88 (45.4)	12 (28.6)	0.04
Abnormal UA Doppler, n (%)	38 (19.6)	5 (11.9)	0.27
Cesarean section, n (%)	142 (73.2)	28 (66.7)	0.39
UA, umbilical artery.			

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