



## PREFEED ASPIRATE VS ABDOMINAL GIRTH: WHICH IS A BETTER PREDICTOR OF FEED INTOLERANCE

**Dr. Ashka M. Shah**

M.D. Paediatrics, Department of Paediatrics, B.J.M.C. Ahmedabad.

**Dr. Charul Purani**

M.D. Paediatrics, Assistant Professor, Department of Paediatrics, B.J.M.C. Ahmedabad.

**Dr. K.M.Meheriya**

M.D.Paediatrics, Professor & Head of Department, Department of Paediatrics, B.J.M.C Ahmedabad.

### ABSTRACT

**INTRODUCTION:** In most cases prefeed aspirate has been given emphasis in monitoring and detecting feed intolerance and risk of NEC while augmenting feeds in VLBW babies but nowadays abdominal girth is also used.

**AIMS AND OBJECTIVES:** To compare abdominal girth monitoring versus prefeed aspirate in prediction of feed intolerance.

**MATERIALS AND METHODS:** Prospective study was conducted in NICU at B.J. Medical College, Ahmedabad from May 2015 to August 2016 in which only healthy stable VLBW neonate babies on tube feedings and expressed breast milk were included.

**RESULTS:** Lesser feed tolerance episodes were found in AG group. The days to reach full enteral feeds ( $P=0.01$ ) were significantly lower in the AG group.

**CONCLUSION:** Monitoring feed intolerance by prefeed abdominal girth had advantages than prefeed aspiration. AG monitoring is thus less invasive and equally effective in monitoring feeding of VLBW babies.

**KEYWORDS :** Prefeed adominal girth, prefeed aspirate.

### INTRODUCTION

Preterm infants can lose up to 20% of their body weight in the first week of life.[1] When nutritional management goals and in-hospital growth criteria are met, long-term outcomes for VLBW preterm infants improve as shown by decreases in the incidence of cerebral palsy, abnormal neurologic examination results, and rehospitalisation[2-4].

Preterm neonates have immature gastrointestinal motility, which manifests as gastroesophageal reflux, delayed gastric emptying and delay in intestinal transit. This results in frequent occurrence of feed intolerance, which usually manifests as vomiting and or abdominal distension. Intolerance to oral feeding results in prolonged parenteral fluid therapy, increased hospital stay, increased risk of sepsis and consequently increased cost of treatment.[5,6]

For decades in most of the NICUs the prefeed aspirate has been given the significant emphasis in monitoring and detecting feed intolerance and the risk of necrotising enterocolitis while increasing feeds in VLBW babies. There is a possibility that repeated aspirations may injure the vulnerable gastric mucosa of the preterm baby. [7]Hence there is a need of non-invasive method which can be routinely used to monitor feeding in these small babies.

This study was undertaken with an aim to evaluate the reliability of abdominal girth measurements in the monitoring of feeding of VLBW babies admitted in the NICU. Our objective was to test the hypothesis whether abdominal girth measurements are as efficacious as prefeed aspiration in monitoring and detecting feed intolerance in VLBW babies.

### METHODS

This double blinded, prospective, randomized controlled trial was carried out from May 2015 to August 2016 at a level III NICU in Civil hospital, Ahmedabad, Gujarat, India. A written informed consent was obtained from the child's parent.

Healthy stable preterm babies with birth weight  $\leq 1500$  grams on tube feeding with expressed breast milk, who were admitted in the NICU, were included.

Neonates who had major congenital anomalies, septicemia, perinatal asphyxia, on ventilator/oxygen therapy, on inotropic support/cafeine, paralytic ileus(hypokalemia), and whose antenatal Doppler studies documented absent or reversed end

diastolic flow were excluded from the study.

### OUTCOME VARIABLES

The primary outcome variable was the time taken to achieve full enteral feeds (180 ml/kg/day and sustaining it for 24 hours).

The secondary outcome variables were feed intolerance episodes, weight gain (grams/day), duration of hospital stay, and incidence of NEC.

### SAMPLE SIZE

Baseline rate of attaining full enteral feedings (for calculation of standard deviation) was derived from review of data of VLBW infants in the 12 months before this study was started. We hypothesized that difference in length of time to achieve full feed would be 40% between two methods of feed intolerance. Intention to treat analysis was applied for statistical convenience. 5% level of significance with a power of 80% was taken into consideration. 280 subjects were randomly allocated into two groups either in the prefeed aspirate group or in the abdominal girth group. There were 140 subjects in each. Randomization was done using the Graphpad software. Sealed opaque envelopes containing the randomization code was opened just before the admission by the head nurse who was blinded to the entire study.

### BASELINE ASSESSMENT

This included the birth weight, gestational age, gender, significant antenatal or perinatal history, clinical diagnosis and laboratory parameters (haemoglobin, C reactive protein, blood culture, immature/total neutrophil count ratio). The gestational age was measured using the Ballard's scoring system.

### FEEDING PROTOCOLS

All infants were given minimal enteral nutrition with expressed breast milk to start with on day 1. Thereafter enteral feeds were advanced by increments of 15ml/kg/day till full enteral feeds of 180ml/kg/day were achieved. Intermittent nasogastric bolus feeds were given at 2 hourly intervals. If any episode of feeding intolerance as defined below was encountered then feeding was discontinued temporarily and one or two feeds were omitted. During this period infant was investigated for sepsis and NEC (blood counts, abdominal x ray, stool for occult blood if need required). If investigations were negative then feeds were restarted at previous amount the baby was tolerating. If the infant was diagnosed to have NEC according management was started.

Feeding intolerance criteria [7] were:

1. vomiting > 3 times during any 24 hour period or any episode of bilious/blood stained vomiting or gross blood in stools
2. prefeed gastric aspirate > 25% of prefeed volume (milk) or any amount bloody/bilious
3. Abdominal girth increase > 2 cm between feeds.
4. Systemic signs like apnoea, cyanosis or bradycardia

In the abdominal girth group every time before the feed abdominal girth was measured by the set of same trained nurses using the same technique. In the prefeed aspiration group every time before feed prefeed aspirate was done by the set of same trained nurses (different from the other group). As a routine care kangaroo mother care was provided to all babies as it is a policy in our set up.

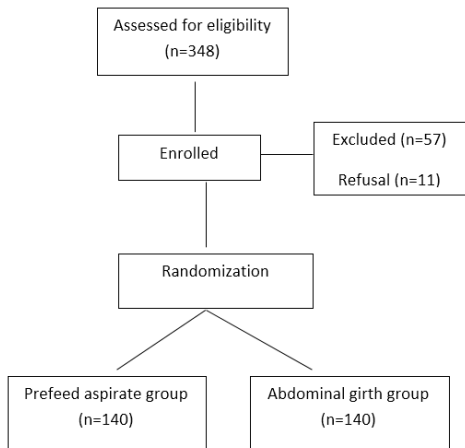
**STATISTICAL ANALYSIS**

Data was entered into Microsoft Excel. Analysis of the data was performed using SPSS 20.0. Comparisons for continuous variables were made by two-tailed independent samples Student's t-test for normally distributed data and by Mann-Whitney rank sum test for non-normally distributed data. For comparisons of categorical data, chi-square test and Fisher's exact test were used wherever applicable.

**RESULTS**

A total of 348 newborns were selected out of which 36 were found to develop septicaemia, 2 had major congenital anomalies, 15 patients required oxygen/ventilator support, 4 patients took discharge against medical advise and 11 gave negative consent. 280 babies were found to be eligible. Figure 1 and Table 1 show baseline characteristics of both groups. At baseline, the two groups were comparable for all variables. Table 2 shows the univariate differences outcomes between the two groups.

**FIGURE 1. Patient allocation**



**Table 1.** Demographic data and clinical characteristics of infants enrolled in the study

	PFA group (n=140)	AG group (n=140)
Birth weight (grams)	1420 ± 380	1380 ± 640
Gest. Age(weeks)	32.57 ± 2.07	32 ± 2.1
Postnatal age(days)	3 (3.0-20.0)	3 (3.0-15.0)
Small for gestational age (%)	18 (12.8%)	23 (6.4%)
Male sex (%)	65 (47%)	64 (46%)
Outborn (%)	79 (56.4%)	68 (48.5%)
Caesarean section (%)	72 (52.1%)	84 (60.0%)
Prenatal steroids (%)	51 (36.7%)	56 (40.2%)

Abbreviation: PFA – pre feed aspirate; AG – abdominal girth

Values are expressed as mean±SD for normally distributed data and median for non-normally distributed data and as numbers(%) for

categorical variables

**Table 2.** Outcome of enteral feeding and other variables in both groups

	PFA group (n=140)	AG group (n=140)	P value
Duration to full enteral feeding (days)	15±6.3	11±7.8	0.01
Feed intolerance episodes (n)	4(0-5.0)	2 (0-5.6)	0.03
Weight gain (gm/day)	17±8.9	20±9.4	0.28
Duration of hospital stay	18±3.7	15±2.9	0.07
Incidence of NEC	11(7.85%)	9 (6.42%)	0.66

Abbreviation: PFA – pre feed aspirate ; AG – abdominal group; NEC – necrotizing enterocolitis  
Values are expressed as mean±sd or median(range)

In the prefeed aspirate group (PFA) the average duration to reach full enteral feeding was 15±6.3 days as compared to 11±7.8 days in the Abdominal girth group (AG). A median of 4 episodes of feed intolerance were observed in the PFA group whereas 2 episodes were seen in the AG group. The weight gain in the PFA group was 17±8.9 gm/day against a gain of 20±9.4 gm/day in the AG group. The average duration of hospital stay in the PFA group was more (18±3.7 days) than the AG group (15±2.9 days). The incidence of necrotizing enterocolitis in the PFA group was 11 out of 140 while in the AG group 9 patients out of 140 developed NEC.

**DISCUSSION**

Feed intolerance is commonly reported in preterm neonates due to various factors related to their gut immaturity. This manifests as increasing gastric aspirates, regurgitation and or abdominal distension. Increase in abdominal girth by 2 cm from the baseline or prefeed gastric residue of >25% are good clinical indicators of feed intolerance[9-12].

Research indicates feeding tolerance is dependent on: gastric residual volume, gastric residual color, stooling patterns, presence of hematochezia, emesis, abdominal distention and abdominal tenderness [13]. Providers often will not proceed with feedings when an infant shows signs of intolerance due to the concern of necrotizing enterocolitis (NEC) developing. NEC is the most common gastrointestinal emergency in the NICU population and usually results in very devastating consequences. It has an overall mortality rate of 10-30%[14].

The consequences of withholding feedings based on the presence of gastric residuals can affect the neonate in many ways, in particular, those related to growth and developmental outcomes. The practice of withholding feedings based on high amounts of gastric residuals has been shown to cause marked delays in reaching goal nutritional needs, poor weight gain and delayed growth [15]. This can cause lasting effects on the neurological development of the neonate. Therefore, more consideration must be placed on researching and providing evidence on feeding through gastric residuals.

In order to facilitate adequate nutrition for neonates, more research needs to be conducted into gastric residuals and how discarding and checking them may be more detrimental to the infant than currently thought by providers. Repeated gastric aspiration to look for residuals could injure the delicate mucosa aggravating the local pathology[7]

Abdominal girth measurement can serve as an alternative to prefeed aspiration for monitoring feeding intolerance in preterm infants.

Our study showed that the duration (days) to reach full enteral feeding (180ml/kg/day) was shorter in the AG group (11±7.8) as compared to the PFA group (15±6.3) (p<0.01). This finding was in

Subsequently the duration of hospital stay was also less in the AG group. Weight gain was more in the AG group ( $p=0.28$ ). The incidence of NEC was 6.42% in the abdominal girth group as compared to 7.85% in the prefeed aspirate group.

Two limitations with abdominal girth are inter-observer variability and changes in the abdominal girth with the time since last defecation. Further studies can validate this point further.

Thus, in conclusion this study showed that abdominal girth measurement can be effectively and reliably utilised as a non-invasive tool for assessing feed tolerance. It can be used in a primary care setting as well.

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