IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 6 Ser. 8 (June. 2019), PP 29-33
www.iosrjournals.org

Early Enteral Feeding In Preterm IUGR Neonates With Abnormal Umbilical Artery Doppler Flow:A Retrospective Study

Rupesh kumar, *J Ashok Raja, N. Muthukumaran, D.S.Jothi
Department of Neonatolgy,Madurai Medical College & Government Rajaji Hospital,Madurai
Corresponding author; Dr J Ashok Raja

Abstract: *This study was done to compare early enteral feeding in preterm IUGR neonates with AREDF on Umbilical artery with preterm IUGR with normal umbilical artery Doppler for time required to attain full enteral feed and increased risk of feed intolerance (FI).* ***METHODS:*** *A Reterospective observational analytical study of preterm intrauterine growth restricted neonates of 28 to 34 weeks with birht weight of ≥ 800 gms, who fed within 24 hour of admission in NICU enrolled from 1st November 2017 to 31 October 2018 were included in analysis. Primary outcomes were Time (in days) required to attain full enteral feed volume and incidence of feed intolerance in neonates fed early. Clinical characteristics were compared between the groups of SGA infants with normal and AREDF.* ***RESULTS:*** *A total of 323 infants with GA<34 weeks and BW<10th percentile were admitted. Of these 102 infants were included in the study, 51 had AREDF and 51 had normal doppler flow in umbilical artery .Infants with AREDF were smaller (1119.9 g vs. 1222.8 g, p = 0.01) and less mature (31.38wks vs. 32.2wks, p = 0.02).Higher proportion of infants with AREDF have PIH in mother those with normal Doppler flow (55% vs. 28%, p = 0.005). In our study,the time required for full enteral feed 11.15 vs 10.40 (in days), p=.46 and incidence of feed intolerance (13% vs. 12%) ,p=.88 was more in AREDF group but it was statistically not significant .Incidence of NEC (8% vs 6%),p=.84 ,Time to regain birth weight and Length of hospital stay is more 20.53 vs 19.84, p=.57, and 42.77 vs 37.28, p=.95 respectively, in AREDF group but was statistically not significant* ***CONCLUSION****: No significant difference in incidence of feed intolerance and NEC, time reqired to attain full enteral feed was found between early feeding in preterm IUGR neonates with AREDF on antenatal UA Doppler compare with preterm neonates with normal UA Doppler.*

Key Word: *Preterm, AREDF, Feed intolerance, NEC*

Date of Submission: 29-05-2019 Date of acceptance: 15-06-2019

I. Introduction

The incidence of low birth weight IUGR in India is 21%. A subset of this IUGR population is identified antenatally to have abnormal umbilical artery (UA) Doppler flow velocities.Infant exposed to abnormal UA doppler flow in utero experience decreased blood flow through the superior mesenteric artery (SMA) and theoretically may be at an increased risk of developing feed intolerance (FI) & necrotizing enterocolitis (NEC) in the neonatal period(6, 7).

Enteral feeding guidelines in infants with absent or reverse end diastolic flow(AREDF) on UA are not standardized, and feeding may be delayed in these infants in an effort to prevent FI & NEC . A systematic review and meta-analysis of 14 observational studies argued strongly in favor of early enteral feed increased risk of NEC in preterm IUGR babies with AREDF on UA Doppler(8).

However, Recent study showed that early introduction of enteral feeding in preterm growth restricted infants resulted in earlier attainment of full enteral feeding and did not increase the risk of FI & NEC (3) . Delaying enteral feeding increases the lenght of hospital stay.In our unit we fed neonates with AREDF in UA as normal neonates. Retrospective cohort study was done to measure the time required to attain full enteral feeding , incidence of feed intolerance (FI) and NEC

II. Methods

A Retrospective observational study was planned at Madurai Medical college NICU From 1st November 2017 to 31st October 2018 .

Neonates included in our study were IUGR preterm neonates with Gestational age ≥28 weeks and ≤34 weeks With AREDF on UA Doppler Birth weight ≥800gms and below the 10th centile for the gestational age. Neonates with perinatal asphyxia (APGAR score <6 at 1 minute),Need ventilator supports at the time of admission, Systemic illness (septicemia, severe respiratory distress), and on drugs like morphine or aminophylline, which could affect gastrointestinal motility, lethal Congenital anomalies were excluded. The

complete data was retrieved using our National Health Mission(NHM) neonatal database and the Doppler data was obtained from the obstetric department ultrasound database.

Our NICU feeding policy is to feed all neonates within 24 hour of birth, irrespective of antenatal Doppler artery flow pattern.Neonates were fed with exclusive breast milk feeding with mothers' own milk or donor breast milk. Full feeds were defined as daily enteral feed volumes of 180ml/kg/day.

Feeding was defined as initiation of expressed breast milk (EBM) feeding within 24 hours of birth with Minimal enteral nutrition (MEN) with EBM was given in all cases and continued for 24 hours . Feed progression using EBM was done according to birth weight.Details of feeding advancement protocols is given in table 1.

Table 1: Feeding advancement protocol (in ml/kg/day) for enrolled neonates

Birth weight(in gms)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
800-999 gm	**10**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
1000-1499 gm	**15**	**25**	**25**	**25**	**25**	**25**	**25**	**25**		
>1500 gm	**30**	**30**	**30**	**30**	**30**	**30**				

MONITORING:

Monitring of feed intolerance and NEC was done using a combination of clinical parameters includes abdominal distension, pre-feed gastric aspirate volume and colour and bowel gas pattern on abdominal radiograph. Details of these parameter of feed intolerance and NEC is given in table 2 and table 3 respectively.

SAMPLE SIZE CALCULATION:

Sample size was calculated based on prior studies that time to reach full feed was 13.4 days with standard deviation of 4.6 days, with this assumptions ,the study has atleast 80% power and 95 % confidence interval to detect minimum difference of 2.4 days in mean time to reach full feed in 11 days with standard deviation of 4, sample size should be 102 cases.

Table 2: Approach to feed intolerance

Parameter	**Finding**	**Action**
1. Abdominal girth	>2 cm increase over baseline in 24 h	Withhold feeding
2. Pre-feed aspirate volume	>50% of feed volume (to be checked after 3 feeds)	Withhold feeding and evaluate for NEC
3. Pre-feed aspirate color	Bilious/altered or fresh blood	Withhold feeding and evaluate for NEC
4. Vomiting	>1 vomitus with yellow or green color and/ or altered blood	Withhold feeding and evaluate for NEC

Table 3: Criteria and Classification of Necrotizing Enterocolitis

Stage	**Classification**	**Clinical Signs**	**Radiologic Signs**
I	Suspected	Abdominal distention, bloody stools, emesis/gastric residuals, apnea/lethargy	Ileus/dilatation
II	Proven	Above with: abdominal tenderness acidosis and thrombocytopenia	pneumatosis intestinalis and/or portal vein gas
III	Advanced	Above with: hypotension, significant acidosis, thrombocytopenia/DIC, Neutropenia	Above with pneumoperitoneum

III. Statistical Analysis

Baseline variables were analyzed using descriptive statistics. p-value of 0.05 was taken as significant.It was done on SPSS v 23. Analysis of continuous data with normal distribution was analyzed by student t test. Non- normally distributed data by Mann-Whitney U test. Categorical data was analyzed by chi-square test and Fischer exact where applicable.

IV. Results

A total of 323 infants with GA<34 weeks and BW<10th percentile were admitted in our unit. Of these 102 infants were included in the study, 51 had AREDF and 51 had normal doppler flow in umbilical artery .

Infants with AREDF were smaller (1119.9 g vs. 1222.8 g, *p = 0.01*) and less mature (31.38wks vs. 32.2wks, *p = 0.02*).Higher proportion of infants with AREDF have PIH in mother those with normal Doppler flow (55% vs. 28%, *p = 0.005).* There were no differences in the other maternal and neonatal demographic and clinical characteristics.

In our study, mean time required for full enteral feed is more 11.15 vs 10.40 (in days), *p=.46* and incidence of feed intolerance was more in AREDF group (13% vs. 12%),*p=.88,* but it was statistically not significant.

Incidence of NEC (8% vs 6%),*p=.84,* was more in AREDF groups, Time to regain birth weight and Length of hospital stay is more 20.53 vs 19.84, *p=.57,* and 42.77 vs 37.28, *p=.95* respectively, in AREDF group but was statistically not significant.

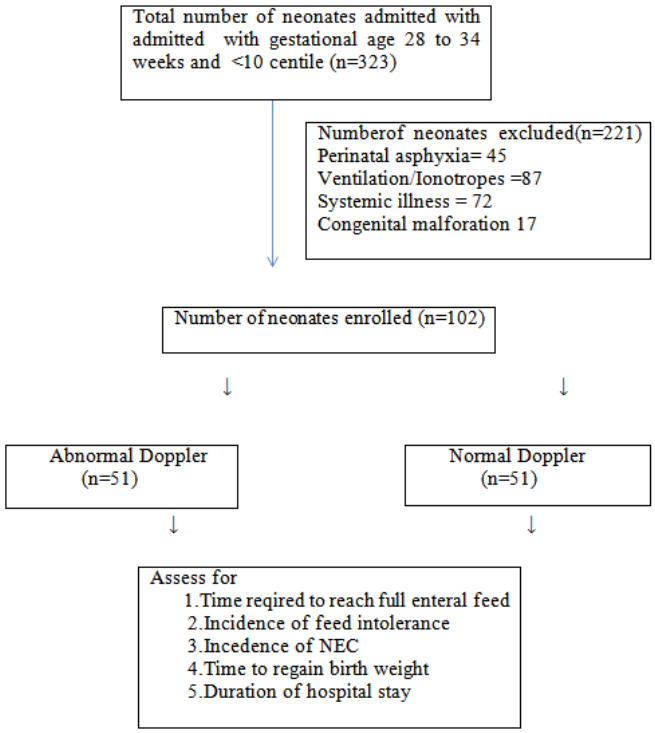

Fig 1: Flow chart of enrolled neonates.

Outcome were separately measured for ELBW neonates. Total of 23 neonates,11 with abnormal Doppler flow and 12 with normal Doppler flow were found, although incidence of feed intolerance and NEC were higher in

Table 4: Baseline characteristics of the enrolled neonates

Charateristics	Abormal Doppler (n=51)	Normal Doppler (n=51)	P value
Gestational age (weeks)a	31.38(1.70)	32.21(1.46)	0.01
Birth weight(gm)a	1119.89(192.64)	1222.84(255.33)	0.02
Males, n (%)	28(55)	26(52)	0.76
Apgar score (5 min)a	7.83(0.89)	7.66(0.98)	0.35
Antenatal steroids, n (%)	38(74)	35(69)	0.73
PIH in mother, n(%)	28(55)	15(28)	0.005
Cesarean delivery, n (%)	23(44)	16(29)	0. 09
a=Values are in Mean(SD) ; p<0.05 is significant.			

ELBW neonates (36% vs 33%) ,p=.53 and (18% vs 16%),p=.32. respectively, but it was also not clinically insignificant.

Table 4: Primary outcome:

Outcome measures	Abnormal Doppler (n=51)	Normal Doppler (n=51)	P value
Time required to attain full enteral feed(in days) a	11.15(5.28)	10.40(5.09)	0.46
Feed intolerance, n (%)	7(13)	6(12)	0.88
a=Values are in Mean(SD) ; p<0.05 is significant.			

V. Discussion

Prematurity is risk factors for many complications leading to significant morbidity and mortality [7].The additional effect of intrauterine growth retardation with abnormal umbilical artery Doppler flow .Earlier studies have shown an association between AREDF on UA and feed intolerance (FI) and NEC , while recent studies have failed to show a causal association.

Table 5: Secondary outcomes

Outcome measures	Abnormal Doppler (n=51)	Normal Doppler (n=51)	P value
Incidence of NEC, n(%)	3(6)	4(8)	0.84
Time to regain birth weight(in days)a	20.53(6.21)	19.84(6.28)	0.57
Duration of hospital stay (in days)a	42.77(15.37)	37.28(17.51)	0.95
a =Values are in Mean(SD) ; p<0.05 is significant.			

It has been hypothesized that IUGR neonates with AREDF on UA may have more feeding problems than than normal Doppler Doppler flow on UA, as uteroplacental insufficiency may cause intestinal ischemia and decreased intestinal growth [9]. We found a higher incidence of feed intolerance and NEC in AREDF on UA babies than normal flow on UA babies though the difference was not statistically significant.

In our study, though the incidence of FI and NEC was more in IUGR with AREDF on UA group (13% vs. 12%) vs (4% vs 3%) but it was statistically not significant. Similarly, Alison Leaf et al. [4] also found early introduction of enteral feeds results in earlier achievement of full enteral feeding. Early feeding is not associated with a higher risk of NEC. Ahamed M.F. et al [14] also concluded in his reterospective study that Doppler flow

Table 5: Outcome in ELBW neonates

Outcome	<1000gms		P value
	Abnormal Doppler (11)	Normal Doppler (12)	
Feed intolerance n(%)	4(36)	4(33)	.53
NEC n(%)	2(18)	2(16)	.32

was no longer a significant predictor of feeding intolerance. Spranger, V. Et al (2005) in his study shows our results thus do not support the delay of enteral feedings based on prenatal Doppler pathology[15].

The strengths of this study was neonates fed early within 24 hours of birth. Outcomes were measured separately for ELBW neonates.The outcome measure of time to attain sufficient feed Volume. The feeding initiation and advancement as per the feeding advancement protocol resulted in a low incidence of NEC.

This study shows that early feeding in preterm IUGR neonates with AREDF using exclusive breast milk as per a standardized feeding initiation and advancement plan does not increase the risk of NEC or FI.

The limitation of our study is the small sample size.This is probably responsible for not achieving statistical significance in the incidence of feed intolerance and NEC in AREDF babies.

VI. Conclusion

Our study shows that initiation of early feeding in preterm IUGR neonates between 28 and 34 weeks as per a feeding initiation and advancement protocol results in no statistically significant difference in any outcomes in neonates with AREDF on UA.

References

[1]. Bozzetti, V., Paterlini, G., Delorenzo, P., Meroni, V., Gazzolo, D., Bel, F. Van, … Tagliabue, P. E. (2013). (AGA) as compared to those small for gestational age (SGA), *7058*(16), 1610–1615. https://doi.org/10.3109/14767058.2012.746303

[2]. Bozzetti, V., Tagliabue, P. E., Visser, G. H. A., Bel, F. Van, & Gazzolo, D. (2013). Early Human Development Feeding issues in IUGR preterm infants. *Early Human Development*, *89*, S21–S23. https://doi.org/10.1016/j.earlhumdev.2013.07.006

[3]. Dogra, S., Mukhopadhyay, K., & Narang, A. (2012). Feed Intolerance and Necrotizing Enterocolitis in Preterm Small-for-Gestational Age Neonates with Normal Umbilical Artery Doppler Flow, *58*(6), 10–13. https://doi.org/10.1093/tropej/fms026

[4]. Dorling, J., Kempley, S., Leaf, A., & Nec, R. O. F. (2005). Feeding growth restricted preterm infants with abnormal UA blood flow, 359–364. https://doi.org/10.1136/adc.2004.060350

[5]. Eger, S. H. W., Kessler, J., Kiserud, T., Markestad, T., & Sommerfelt, K. (2015). Foetal Doppler abnormality is associated with increased risk of sepsis and necrotising enterocolitis in preterm infants, 368–376. https://doi.org/10.1111/apa.12893

[6]. Geary, E. (2013). Risk of Necrotizing Enterocolitis and Feeding Interventions for Preterm Infants With Abnormal, *32*(1), 5–15.

[7]. Ka, K., & Je, T. (2008). Rapid versus slow rate of advancement of feedings for promoting growth and preventing necrotizing enterocolitis in parenterally fed low-birth-weight infants (Review), (4).

[8]. Kempley, S., Gupta, N., Linsell, L., Dorling, J., Mccormick, K., Mannix, P., … Leaf, A.(2014). Feeding infants below 29 weeks ' gestation with abnormal antenatal Doppler : analysis from a randomised trial, 6–12. https://doi.org/10.1136/archdischild-2013-304393

[9]. Lee, V. R., Pilliod, R. A., Frias, A. E., Rasanen, J. P., Shaffer, B. L., & Caughey, A. B. (2015). When is the optimal time to deliver late preterm IUGR fetuses with abnormal umbilical artery Dopplers ? *The Journal of Maternal-Fetal & Neonatal Medicine*, *0*(0), 1–6. https://doi.org/10.3109/14767058.2015.1018170

[10]. Trial, O. R., Tewari, V., Dubey, S. K., Kumar, R., Vardhan, S., Sreedhar, C. M., & Gupta G. (2017). Early versus Late Enteral Feeding in Preterm Intrauterine Growth Restricted Neonates with Antenatal Doppler Abnormalities : An, 1–11. https://doi.org/10.1093/tropej/fmx018

[11]. Trial, R., Leaf, A., Dorling, J., Kempley, S., Mccormick, K., Mannix, P., … Brocklehurst, P. (2013). Early or Delayed Enteral Feeding for Preterm Growth-Restricted Infants : A Randomized Trial. https://doi.org/10.1542/peds.2011-2379

[12]. Botero D, Lifshutz F. Intrauterine growth retardation and long-term effects on growth. Curr Opin Pediatr 1999;11:340–7.

[13]. Kinare AS, Chinchwadkar MC, Natekar AS, et al. Patterns of fetal growth in a rural Indian cohort and a comparison with a western European population, data from the Pune Maternal Nutrition Study. J UltrasoundMed 2010;29:215–23.

[14]. M.F. Ahamed, Pe'er Dar, M. Vega, Mimi Kim, Q. Gao and T. Havranek (2017). https://doi.org/10.3233/NPM-1682

[15]. Spranger, V, & Genzel-boroviczeny, O. (2005). Does chronic prenatal Doppler pathology predict feeding difficulties in neonates?, 1632–1637. https://doi.org/10.1080352505.

Dr J Ashok Raja. "Early Enteral Feeding In Preterm IUGR Neonates With Abnormal Umbilical Artery Doppler Flow:A Retrospective Study". IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) , vol. 18, no. 06, 2019, pp. 29-33.