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A Clinical Case Report On Beneficial Use Of Intravenous Amino Acids On A Very Low Birth Weight Infant At NICU/SNCU , Women's Hospital,Nanded, Maharashtra.

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Abstract
Premature infants, especially those born less than 1500 g, often exhibit slow overall growth after birth and lack of early nutritional support may be an important element. We tested the hypothesis that early administration of amino acids in a case of infant born with less than 1500 gm weight and its effect on its growth and early development.

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I. Introduction

The preterm infant misses the last trimester of fetal nutrient accretion and requirement for immediate nutrient delivery that included amino acids may be essential due to limited glycogen and fat reserves. Despite this information, significant nutrient deficiencies are observed in the neonatal intensive care unit (NICU) and premature infants are frequently discharged at weights less than the 10th percentile[1]. Perhaps more concerning than low discharge weights is the association of poor growth in the early weeks of hospitalization with abnormal neurodevelopment and an increased prevalence of cerebral palsy. The goal of early amino-acid (EAA) supplementation is to provide the preterm infant with intravenous substrate that promotes protein deposition and increased lean body mass that more closely approximates fetal energy production and growth. Recently, it has become evident that protein delivery of 3 g kg per day beginning on day 1 of life is safe and is associated with plasma amino-acid concentrations similar to those of second and third trimester fetuses. Protein deliveries as minimal as 1.5 g kg per day have resulted in a neutral/positive nitrogen balance in most infants but maximizing protein to provide 3 g kg per day beginning immediately after delivery may further enhance protein deposition that is essential for early growth[5].

II. Case

A preterm(33.4 wks) baby with birth weight 1.320kg born in outside Pvt hospital was refered to Govt. Womens Hospital, Nanded on day of life 4 with complains of Very Low Birth weight, Respratory Distress. Post admission in NICU baby was recorded to have following vitals.

Vitals and physical examinations results on admission			
CTA	*Poor*	*SPO2*	*88% in RA*
CRT	*<3 secs*		*98% in 2l 02*
HR	*130 bpm*	*Ant Frontanale*	*normal*
RR	*36 bpm*	*Neonatal reflex*	*Depressed*
ICTERUS	*++*	*PALLOR*	*+*

The infant did not have any history of lung surfactant administration , convulsions and or any other possible complications.

Next Baby's investigations showed

DOL 4	*DOL 8*	*DOL 11*	*DOl 17*
Hb- 11.5 gm%	*Hb-10.6 gm%*	*Hb-11.3 gm%*	*Hb-12.2 gm%*
Tc- 8600 /cmm	*Tc-13920/cmm*	*Tc-13700/cmm*	*Tc-7700/cmm*
Plt-164000/cmm	*Plt-216000/cmm*	*Plt-164000/cmm*	*Plt-223000/cmm*
Crp-7.3 mg/l	*Crp- 8.42 mg/l*	*Crp-3.3 mg/l*	*Crp-1.6 mg/l*
	S.Bil- 12.06mg/l		*Ur-21 mg/dl*
			Cr-0.64 mg/dl
			S Na+- 135 meq/l

Post admission the infant was given proper warm care, oxygen by NP @ 2L/ Hr, started on IV antibiotics (Imepenam group , aminoglycoside group) , IVF IsoP and started on SSPT. Initially we have started him on RT feeding using Top feed @ 5ml/2nd Hourly initially and planning to grade up 1 ml every 24 hrs. According to CDC/ IAP for the first month infant daily normal weight gain should be around 20-30 gms and we were looking forward to that,But in coming days we faced the real challenges brought about by preterm and LBW. The infant was looking septic and the lab investigations also suggested so along with it the baby was icteric on day of life 7 for with it has hampered the daily nominal weight gain of the infant rather leading to substantial daily weight loss and even we face a challenges of multiple episodes of vomiting post every feed. We started the infant on extra supplement for weight gain(HMF sachet , MCT oil) but significant weight loss upto 1.180 was seen on day of life 12 ,and thats when it was decided to start the infant on intravenous amino acids after explaining the benifits , uses and advantages of the substance. After getting the proper concent from the parents the treatment using intravenous amino acids was started at 2.5 mg/kg/day (recomended 2.5 -3.5 mg/kg/day) from day of life 12 with weight 1.205 kg , the infant had already showen response to antibiotics and septisemia has improved as also showen in the lab investigation and slowly the antibiotics were also tapered off . By day of life 15 its already been day 3 for intravenous amino acids and we are seeing positive results in terms of positive weight gain along with top feed using RT feeding mixed with HMF & MCT Oil. By day of life 25 the preterm infant has already gained weight to 1.400 kg and initial trial for WSF was also given. And by day of life 30 his neonatal reflexes has already became mature and has reached a weight to 1.520 kg , started excepting WSF anf even breast feeding . After reciving 20 days of intravenous amino acids and getting positive results in terms of weight gain and improvemt in better immune response. we were confident to discharge the baby at home as the parents were also having financial problems. And on recent follow up on day of life 62 with weight 2.510 kg with stable vitals and normal reflexes, parents has no complainsand the baby was feeding normaly with top feed.

below has been showenthe daily weight gain of the infant

Daily weight record to help us track the effect of AA intravenous on the infant weight gain					
Day of life	*weight(kg)*	*gain/loss*	*Dayof life*	*weight(kg)*	*gain/loss*
DOL 4	*1.290*		*DOL 18*	*1.280*	*0*
DOL 5	*1.230*	*-60 gm*	*DOL 19*	*1.280*	*0*
DOL 6	*1.170*	*-60 gm*	*DOL 20*	*1.300*	*+20 gm*
DOL 7	*1.220*	*+50 gm*	*DOL 21*	*1.320*	*+20 gm*
DOL 8	*1.220*	*0*	*DOL 22*	*1.330*	*+10 gm*
DOL 9	*1.250*	*+30gm*	*DOL 23*	*1.350*	*+20 gm*
DOL 10	*1.200*	*-50 gm*	*DOL 24*	*1.370*	*+20 gm*
DOL 11	*1.210*	*+10 gm*	*DOL 25*	*1.400*	*+30 gm*

DOL 12	*1.205*	*-05 gm*	*DOL 26*	*1.410*	*+10 gm*
DOL13	*1.190*	*-15 gm*	*DOL 27*	*1.400*	*-10 gm*
DOL 14	*1.180*	*-10 gm*	*DOL 28*	*1.460*	*+60 gm*
DOL 15	*1.230*	*+50gm*	*DOL 29*	*1.470*	*+10 gm*
DOL 16	*1.250*	*+20 gm*	*DOL 30*	*1.520*	*+50 gm*
DOL 17	*1.280*	*+30 gm*	*DOL 31*	*1.540*	*+20 gm*

Demographics data of the case

Birth weight	*1.320 kg*
Gestational age	*33.4 weeks*
Discharge weight	*1.540 kg*
Lowest weight recorded on admission	*1.170 kg*
G.A. at discharge	*38.3 weeks*
Net time	*34 days (4.6 weeks)*
Weight Gain	*370 grams*
present weight as on 01/08/23	*2.510kg(2 months1 day old)*

III. Discussion

Administration of amino acids has been shown to be safe and promotes nitrogen balance and glucose tolerance in preterm infants[3,4] . Our hypothesis was that this nutritional intervention would be associated with better weight gain and decrease growth failure traditionally seen in NICU.

Better weight gain is a bit difficult to interpret because longer hospitalizations should be associated with higher weight gains than shorter hospitalizations and because the duration of hospitalization is not necessarily included in analysis.Some previous studies have examined the relationship of amino-acid delivery with weight gain. This first study was initially powered for examination of glutamine supplementation and therefore weight gain was a secondary analysis of their data[6].They did find that early provision of 3 g kg^{-1} per day of amino acids within 5 days of birth improved weight at 36 weeks compared to preterm infants that received 3 g kg^{-1} per day after 5 days. However, the groups remained in low weight percentiles with 82 and 95% less than the 10th percentile, respectively, according to the Alexander et al. chart. The second study was designed to evaluate preterm infant weight gains at 28 days after amino-acid supplementation and infants were randomly assigned at 3.5 and 2.5 g kg^{-1} per day, respectively.The inclusion criteria were preterm infants 23 to 29 weeks and 6 days gestation in a multicenter (n=11), randomized controlled trial to began amino-acid support with 1 g kg^{-1} per day and advanced by 0.5 to 1 g kg^{-1} per day to final intake of 3.5 and 2.5 g kg^{-1} per day protein, respectively. The higher intake of protein resulted in greater blood amino-acid levels but no difference was observed in weight gain at 28 days (12.9 vs 11.4 g, respectively).

In another evaluating daily enteral intakes approximating 3.2 to 3.5 g kg^{-1} per day protein (500 to 550 mg kg^{-1} per day nitrogen) was able to more closely mimic intrauterine estimations for nitrogen retention. With more immature infants surviving and the established relationship between amino-acid supplementation and extrauterine growth, future studies evaluating greater supplementation levels immediately after delivery such as 3.5 to 4 g kg^{-1} are appropriate.

And in another study they have concluded that parenteral amino acid administration in VLBW infants should be initiated soon after birth at a dose of at least 1.5 g/kg/day to maintain anabolism[8]. The maximum dose for parenteral amino acid should be between 2.5 and 3.5 g/kg/day, with adequate nonprotein calories and micronutrients to ensure efficient protein utilization and growth.

IV. Conclusion

So we can conclude that intravenous amino acid administration should be done in VLBW infants at 2.5 to 3.5 gm/kg/day[2] (in our case @ 2.5 gm/kg /day) for better supplementation of nutrients and growth in the infant.

In a resource limited setup like ours secondary health care center where we have looked forward to provide better supplementation for VLBW infants for nominal growth of the infant reducing the further complications occurring from LBW, just by supplementing the required nutrient for growth , which can further decrease the burden from tertiary care center by managing this particular cases at this resource limited setup. So by giving intravenous amino acid supplementation we can achieve a better result in caring VLBW infants.

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