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Evaluation of role of amino acid infusion in cases of intrauterine growth restriction: Our experience

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Abstract

Aim: To evaluate the effect of amino acid infusion in pregnant mothers with suspected Intra Uterine Growth Restriction diagnosed in antenatal period – whether perinatal morbidity and mortality reduced or not by this treatment.

Material and Methods: 80 cases were taken up for the study, patient were grouped into 2 groups. Group 1: Comprised 40 patients with IUGR who were only observed and no intervention was tried and served as control group. In this group of patient fundal height measurement and ultrasonographic evaluation 4 weekly done in 28-32 weeks of gestation and 2 weekly in patient of more than 32 weeks of gestation. Group 2: Comprised 40 patients with IUGR who received amino acid infusion followed by 10% dextrose for 3 consecutive days. Repeat infusion were done 4 weekly in 28-32 weeks of gestational age and 2 weekly in patient of more than 32 weeks of gestation. Both grouped were followed till term and delivery. Ultrasonography parameters at 36 weeks of gestation in both groups were compared.

Result: Mean abdominal circumference at 36 weeks in study group was 321mm and 294mm in control group. Fetal weight at 36 weeks of gestation in group 1 was 2255 gm and 2588 gm in group 2. Mean AFI at 36 weeks of gestation were 9 cm and in control group it was 5 cm. In study group 90% babies born with apgar score more than 5.

Conclusion: Fetal weight gain was significantly higher in group 2 than group 1, which indicates that the curative effect of amino acid combined with routine therapy is greater than that of routine therapy alone in late onset IUGR.

Keywords: Aminoacid infusion, Intra uterine growth restriction

Introduction

Intrauterine growth restriction is defined as birth weight less than 10th percentile for gestational age and is one of the most important causes of perinatal mortality and morbidity affecting approximately 7-15% of all pregnancies and being more common in developing countries. It occurs when the foetus fails to achieve its full growth potential. It is a failure of adequate placental transfer of nutrients and oxygen from mother to foetus. Intrauterine foetal growth is the result of genetic potential modulated by the nutritional and endocrine environment that influences the supply of nutrients from mother.[1,2]

Amino acids constitute the carbon and nitrogen requirement for the placenta and foetus. Amino acid acts as regulators of placental and foetal development. In addition to being a source of protein building blocks and oxidative fuel sources, amino acids influence metabolic cyclic pathways between placenta and foetus. It Improves vascularity through nitric oxide and stimulates insulin secretion leading to foetal growth.[3]

In growth restricted foetuses, the serum amino acids were found lower than those in normally grown foetuses. Based on this fact, there has been a renewed interest to prevent and treat IUGR by maternal amino acid supplementation and hyper alimentation.

IUGR is a 2nd leading cause of perinatal morbidity and mortality. It leads to 5-20 fold increase in perinatal mortality and 40-50% babies require neonatal intensive care.

Aim

To evaluate the effect of amino acid infusion in pregnant mother with suspected IUGR diagnosed in antenatal period- whether perinatal morbidity and mortality reduced or not by this treatment.

Material and Method

The present study included 80 antenatal patients coming to antenatal OPD or the ward having IUGR between 2013-15.

Inclusion criteria

a. Clinically suspected cases of IUGR which were confirmed by foetal anthropometric parameters. Gestational age in weeks, Amniotic fluid index and other anthropometric parameter based on sonography.
b. IUGR without complications

Exclusion criteria were

a. Premature rupture of membranes
b. IUGR with congenital anomaly of foetus.

Patients were grouped into 2 groups

Group 1(Control group) – 40 patients with IUGR were managed on routine antenatal treatment on OPD basis.

Group 2 (Study group) – Cases received infusion of 200ml amino acid infusion containing 8 essential and 10 non-essential amino acid and xylitol in a balanced ratio, as proposed by FAO/WHO, followed by 10% dextrose drip for 3 consecutive days after admission.

Follow up was done every 4 weekly in less than 32 weeks and every 2 weeks in more than 32 weeks pregnancies. Analysis of foetal growth and amniotic fluid index improvement after amino acid infusion were monitored closely by repeat ultrasound scan at four weeks interval in patients of < 32 weeks of gestation.

Both groups were followed till term and delivery. Ultrasonography parameters at 36 weeks of gestation in both groups were compared after that the pregnancy outcome of study and control group were compared.

Result

Out of 80 antenatal cases with IUGR, 40 cases (study group) received amino acid infusion. Improvement in perinatal outcome was compared with control group. Ultrasonographic parameters at 36 weeks of gestation in both group were compared. Malnutrition, PIH and anaemia in both groups are major cause of IUGR.

In study group mean abdominal circumference was found 321 mm at 36 weeks of gestation and in control group 294 mm was found. Mean foetal weight at 36 weeks of gestation in study group was 2588 gms and in control group was 2255 gms. In control group apgar score of babies at birth, less than 5 were 30% and more than 5 were 70% respectively. In study group babies with apgar score with less than 5 were 10% and more than 5 were 90% respectively. Mean AFI at 36 weeks of gestation in study group were 9.0 cm and in control group were 5 cm.

In study group we observed that after infusion of amino acid abdominal circumference, foetal weight and AFI was significantly improved, which indicates that the curative effect of amino acid combined with routine therapy is greater than that of routine therapy alone in late onset IUGR.

Table 1: Table showing the IUGR with associated Maternal Risk Factors

Risk Factors	Group - I	Group - II
Malnutrition	15	16
PIH	10	9
Anaemia	6	7
History of IUD	4	4
History of IUGR	5	4
Total	40	40

Table 2: Table showing the Apgar score at Birth

Apgar Score	Group – I		Group - II	
	No.	%	No.	%
< 5	12	30	4	10
> 5	28	70	36	90

Table 3: Table showing Abdominal Circumference (AC in mm) at various gestational age

Group – I					Group - II							
GA	Mean AC at 1st visit	Mean AC at 28 wks	Mean AC at 32 wks	Mean AC at 36 wks	GA	Mean AC at 1st visit	No. of Inf.	Mean AC at 28 wks	No. of Inf.	Mean AC at 32 wks	No. of Inf.	Mean AC at 36 wks
18	91	221	248	280	18	92	2	222	4	250	6	303
24	160.5	230	260	274	24	158	2	230.5	3	270	4	303.02
28	210		255	273	28	210			2	281	4	330
32	245			320.5	32	245					2	334.04
34	252			320	34	252.5					2	334.05

Table 4: Table showing the Fetal Weight (in gms) at various Gestational Age

Group – I					Group - II							
GA	Mean FW at 1st visit	Mean FW at 28 wks	Mean FW at 32 wks	Mean FW at 36 wks	GA	Mean FW at 1st visit	No. of Inf.	Mean FW at 28 wks	No. of Inf.	Mean FW at 32 wks	No. of Inf.	Mean FW at 36 wks
18	248.5	805	1485.5	2170	18	249.5	2	805	4	1495	6	2350
24	435	785	1470.5	2222.5	24	436.7	2	780	3	1498.5	4	2390
28	750		1470	2215	28	760			2	1590	4	2660
32	1385			2365	32	1288.20					2	2775
34	1985			2300	34	1884.5					2	2765

Table 5: Table showing the Amniotic Fluid index (in cm) at various Gestational Age

Group – I					Group - II							
GA	**Mean AFI at 1st visit**	**Mean AFI at 28 wks**	**Mean AFI at 32 wks**	**Mean AFI at 36 wks**	**GA**	**Mean AFI at 1st visit**	**No. of Inf.**	**Mean AFI at 28 wks**	**No. of Inf.**	**Mean AFI at 32 wks**	**No. of Inf.**	**Mean AFI at 36 wks**
18	2	2	3	3	18	3	2	4	4	5	6	6
24	2	2	3	3	24	3	2	4	3	6	4	7
28	3		3	4	28	4			2	6	4	8
32	4			4	32	4					2	7
34	4			4	34	5					2	7

Discussion

Perinatal mortality and morbidity among babies with IUGR are manifold higher than those in normally grown foetuses of similar gestation. Diagnosis of IUGR is important, as timely diagnosis and management can prevent many of perinatal morbidity and due to unfavourable intrauterine environment. Therefore various attempts are being made to predict and diagnose IUGR early. Various therapies are tried to prevent and treat IUGR as to improve overall perinatal mortality and morbidity.

IUGR is a condition caused by shallow trophoblast invasion during the early stages of gestation.[4] Second important cause of IUGR and associated complications said to be inadequate nutrition to mother.[5] Pre eclampsia may cause fetal growth failure and is an indicator of its severity, especially when the onset is before 37 weeks.[6,7] Awasthi et al[3] reported an incidence of IUGR of 37% among women suffering from moderately severe anemia (Hb< 8gm %). D. Acharya et al[8] found maternal malnutrition and anemia in pregnancy is strongly associated with IUGR. IUGR babies in group 1 had substantially reduced capacity to tolerate the hypoxic stress of labour, due to marked depletion of energy stores in the liver and subcutaneous tissues.[9]

In group 2 patient with amino acid infusion 90% of patients of IUGR delivered neonates with apgar score>5 and mean AC at 36 weeks of gestation is more than in group 1. Herbert et al (1986) demonstrated that abdominal circumference is more sensitive marker of the change in foetal growth after total parenteral nutrition. Amino acid infusion had significant effect on improvement of AC because it is related to liver size, which is a reflection of fetal glycogen storage.[11-14] Abdominal circumference reflects fetal nutrition.[15] Mean fetal weight (in gms) at 36 weeks of gestation is more in group 2. Maximum growth of fetus occurs during 30-34 weeks of pregnancy.

The finding of the present series are in keeping with Lampariello and X. M. Xiao.[16-17] In group 2 the mean birth weight was significantly higher than in group 1 which indicates that the curative effect of L-Arginine combined with routine therapy. L-Arginine has a more significant effect on the improvement of uteroplacental microcirculation, which improves the placental oxygen supplying function in cases of IUGR. Various studies have tried intravenous infusion of large amount of amino acid and glucose appears to improve the AFI.[1] In present series AFI at 36 weeks was significantly improved with amino acid infusion. This improvement may not have been achieved with diet alone because of non-compliance and socioeconomic status.[1] The present study suggest parentral transfusion of amino acid in cases of IUGR significantly increases the birth weight, abdominal circumference, AFI and apgar score of a baby at birth.

Conclusion

In present series with best of efforts, we had only 80 patients for the final follow up. Even though the series had been small and follow up short with majority of patients belonging to low socioeconomic status having either unwillingness or poor compliance to the treatment, which handicapped the scope of our observation and result.

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