

Effect of Amino Acids Infusion on Maternal and Perinatal Outcome in 3rd Trimester Idiopathic Oligohydramnios

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ABSTRACT

Background: Unexplained 3rd trimester oligohydramnios is associated with adverse pregnancy outcomes if not treated appropriately. We conducted this study to evaluate the role of parenteral amino acids to improve amniotic fluid volume in idiopathic oligohydramnios encountered in the 3rd trimester thus improving perinatal outcomes.

Methods: This study was conducted at the department of obstetrics and gynecology, Arif Memorial teaching hospital for a period of two years from January 2020 till December 2021. A total of 60 cases of confirmed idiopathic 3rd trimester oligohydramnios were included in the study. They were infused with intravenous amino acid infusion on alternate days for a week then once weekly till the patient was delivered with weekly serial ultrasound monitoring for the increase in AFI. The maternal outcome was noted in terms of mode of delivery. The fetal outcome was noted in terms of healthy newborns, LBW babies, need for NICU admission, and poor Apgar score. All this relevant information was entered in a predesigned proforma. Data were analyzed in SPSS version 22.

Results: The mean age of the participants was 28.5±4.6years. The mean gestational age at presentation was 31.4±2.10weeks. There were 25 (41.6%) primi gravida, 35 (58.3%) were multi gravida. The mean value of AFI before amino acid infusion in the study population was 5.1±1.35. There were 11 cases (18%) of AFI <5cm, 49(81%) cases of AFI between 5.1-8cm at the first visit. While after amino acid infusion, 6 (10%) patients were observed in severe oligohydramnios group while 33 (55%) in borderline oligohydramnios group and 21(35%) patients had AFI improved to normal range i.e. >8cm at the time of delivery. The mean increase in AFI after amino acid infusion in the study population at the time of delivery was 2.30±0.65. Out of 60 patients, 42 (70%) delivered by vaginal route at term, 15 (25%) cases delivered by cesarean section, and 1 patient (2%) delivered by instrumental delivery. All these deliveries were at term. While 2 (3.3%) cases were delivered preterm due to no improvement in AFI which remained <5cm even after amino acid infusion.

Conclusion: Parenteral amino acid infusion in unexplained oligohydramnios in the third trimester may result in improved pregnancy outcomes.

Keywords: Amino acid infusion, Maternal and perinatal outcome, Idiopathic oligohydramnios

INTRODUCTION

Oligohydramnios is defined as amniotic fluid volume that is less than the 5th centile expected for the given gestational age. It is typically diagnosed by ultrasound examination by calculating the amount of liquor in four quadrants of the uterus and summing up the total amount. It is described qualitatively (decreased AFI) or quantitatively (AFI <5cm, with single vertical pocket <2cm.)¹. It affects 4.4% of all term pregnancies and 1% of the preterm pregnancies². Oligohydramnios is said to be idiopathic when maternal (hypertension use of prostaglandin synthetase inhibitors, PPROM), fetal (anomaly) and placental (placental insufficiency) causes of oligohydramnios have been ruled out. In the 3rd trimester, it has been observed that fetuses have unexplained oligohydramnios in 52.5% of cases³.

Amniotic fluid production and consumption vary with gestational age. Various factors are involved in this dynamic process, the most significant is being the fetal urination and swallowing. The average amniotic fluid index in the 3rd trimester is 8-25cm and approximate amniotic fluid volume in term pregnancy is about 800ml⁴. Amniotic fluid helps the fetus to move in the womb thus allowing proper growth, lung development, prevents pressure on the umbilical cord, maintains a constant pressure around the fetus thus preventing the fetus from heat loss, and also provides cushioning effect⁵. An inadequate liquor volume can result in fetal lung hypoplasia, IUGR, LBW, prematurity, and fetal demise. As the importance of amniotic fluid in fetal nutrition is well acknowledged so fetal malnutrition can be directly correlated to abnormalities of amniotic fluid and its consequences on neonatal health⁶.

Amino acid infusion is suggested for the treatment of idiopathic oligohydramnios in modern obstetrics. These amino acids constitute the carbon and nitrogen requirement for the placenta and the fetus. These are shown to improve vascularity through nitric oxide and stimulate insulin secretion leading to fetal growth⁷. There is global evidence that maternal nutritional status can alter the epigenetic status (stable alternation of gene expression through DNA methylation and histone modification of fetal genome). This may provide a molecular mechanism for the role of maternal nutrition effect on the fetus. The under nutrition of amino acids leads to a growth-restricted fetus with a reduction in liquor volume ultimately affecting the fetal outcome. Improved maternal nutritional status by intravenous amino acid infusion appears to improve AFI. This may not be achieved by diet alone probably due to maternal non-compliance and poor socio-economic status in low-income countries like ours⁸.

As the presence of the unexplained oligohydramnios in the 3rd-trimester yields elevated perinatal mortality and morbidity and its effect on fetomaternal outcome has been a matter of clinical debate in modern obstetrics and the obstetricians consider the pregnancy with unexplained oligohydramnios as **High-Risk Pregnancy**, that is why they recommend vigilant surveillance for amniotic fluid along with parenteral amino acid infusion to improve AFI in advanced set up to evaluate and manage and prevent the associated adverse pregnancy outcomes.

Rationale of the study: This study aims to determine the perinatal outcome to provide a database to the obstetricians to formulate the appropriate amino acid infusion regimen for the patients with 3rd trimester unexplained oligohydramnios of varying degrees to improve perinatal outcome.

The objective of the study was to determine the effect of amino acid infusion on maternal and perinatal outcome in 3rd trimester idiopathic oligohydramnios.

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MATERIAL AND METHODS

This prospective cohort study was carried out in the Department of Obstetrics & Gynecology, Arif Memorial Teaching Hospital for a period of two years from January 2020 till December 2021 on 60 pregnant females who participated in this study after taking written informed consent. The approval letter was taken from the ethical committee of Rashid Latif Medical Complex. All the pregnant women aged 18-40 years, presenting at 28-37 weeks of gestational age with confirmed idiopathic oligohydramnios were included in this study.

Operational definition:

- 1) Severe oligohydramnios i.e. those with AFI <5cm
- 2) Borderline oligohydramnios i.e. {Moderate oligohydramnios i.e. With AFI 5.1-7cm and Mild oligohydramnios i.e. with AFI 7.1-8cm}
- 3) Those with AFI >8cm i.e. Adequate AFI

AFI was measured using a curvilinear 3.5 MHz Transducer on Canon Xario 100 ultrasound machine. The ultrasound for AFI was done using the same machine to eliminate bias. Females having oligohydramnios associated with the congenital fetal anomaly, maternal hypertensive disorders, twin pregnancy, or those with ruptured membranes were excluded from the study. The demographics of the participants were noted. The participants of the study were infused with intravenous amino acid infusion on alternate days for a week then once weekly till the patient delivered. They were monitored for improvement in liquor volume by weekly ultrasounds done for AFI. If liquor remained <5cm despite the infusion of intravenous amino acids for 2 weeks, then the non-responders were considered for delivery irrespective of the gestational age after completing steroid cover.

The maternal outcome was noted in terms of term/preterm

Table-2: Distribution of cases according to the mode of delivery after parenteral amino acids

MOD	Severe oligohydramnios	Borderline oligohydramnios	Adequate AFI
Preterm vaginal delivery 2 (3.3 %)	2	0	0
Instrumental delivery 1 (2 %)	0	1	0
Normal vaginal delivery 42 (70%)	2	30	10
Caesarean section 15 (25%)	Fetal distress 1 Meconium stained liquor 1 IUGR 2	Fetal distress 4 Meconium stained liquor 5 IUGR 2	0

Table 3: Distribution of cases according to perinatal outcome after parenteral amino acids

Perinatal outcome	Severe oligohydramnios	Borderline oligohydramnios	Adequate AFI
Healthy 29 (37%)	5	14	10
LBW 15 (25%)	8	6	1
NICU Admission 10 (16%)	7	2	1
Low Apgar score <7 6 (10%)	5	1	0

Table 2 showed that out of 60 patients, 42 (70%) delivered by vaginal route at term with 2 patients in severe oligohydramnios group, 30 cases in borderline oligohydramnios, and 10 cases in adequate AFI category. 15 (25%) cases were delivered by caesarean section with 1 caesarean for fetal distress, 1 for meconium-stained liquor and 2 for IUGR in severe oligohydramnios category, 4 caesarean for fetal distress, 5 for meconium-stained liquor, and 2 for IUGR in moderate oligohydramnios category. 1 patient (2%) delivered by instrumental delivery in moderate oligohydramnios category. All these deliveries were at term. While 2 (3.3%) cases were delivered preterm due to no improvement in AFI which remained <5cm even after amino acid infusion for 2 weeks.

Table 3 shows the fetal outcome in relation to the amniotic fluid index. Here in our study, there were 29 (37%) healthy newborns delivered with 5 in AFI <5cm, 14 in borderline oligohydramnios, and 10 in the adequate AFI category. There were 15 (25%), LBW babies, with 8 in severe oligohydramnios, 6 in borderline oligohydramnios, and 1 in the adequate AFI category. There were 10 (16%) babies who were admitted to NICU with 7 in severe oligohydramnios, 2 in borderline oligohydramnios, and 1 in adequate AFI category. 6 (10%) babies were delivered with an

delivery and mode of delivery. The fetal outcome was noted in terms of healthy baby, neonatal birth weight, NICU admission, and Apgar score. All this relevant information was entered in a predesigned proforma. Data were analyzed in SPSS version 22.

RESULTS

The mean age of the participants was 28.5±4.6 years. The mean gestational age at presentation was 31.4±2.10 weeks. There were 25 (41.6%) primi gravida, 35 (58.3%) were multi gravida. The mean value of AFI in the study population was 5.1± 1.35. The study population was distributed according to amniotic fluid index at the time of presentation and then after amino acid infusion with improvement in AFI at the time delivery (whether AFI <5cm or 5.1-7cm and 7.1-8cm or >8cm).

Table 1 shows that there were 11 (18%) cases of severe oligohydramnios, 49 (81%) cases of borderline oligohydramnios at the first visit. While after amino acid infusion, this number dropped to 6 (10%) in the severe oligohydramnios (<5cm AFI) group while it dropped from 49 to 33 (55%) in the borderline oligohydramnios group. There were 21 (35%) patients who had AFI improved to normal range i.e. >8cm at the time of delivery. The mean increase in AFI in the study population at the time of delivery was 2.30± 0.65.

Table- 1: Case distribution according to AFI on the first visit and at time of delivery

Amniotic fluid index	At 1 st visit	At delivery
Severe oligohydramnios	11 (18.3 %)	6 (10 %)
Borderline oligohydramnios	49 (81.6 %)	33 (55 %)
Adequate AFI	-----	21 (35 %)

Apgar score <7 amongst which 5 were in severe oligohydramnios, and 1 was in the borderline oligohydramnios category.

DISCUSSION

Idiopathic oligohydramnios is decreased amount of amniotic fluid with 50.7% cases diagnosed in 3rd trimester⁹ that is associated with meconium staining of amniotic fluid, fetal heart conduction abnormalities, umbilical cord compression, poor tolerance of labour trial, low Apgar score, and increased chances of caesarean section due to fetal distress¹⁰. Amino acids are an essential nutritional component of amniotic fluid and maternal IV supplementation of amino acids in case of idiopathic oligohydramnios may alter amino acid concentration in amniotic fluid. The rise in the amniotic fluid after the maternal amino acid infusion has been reported in literature¹¹.

In our study, there were 11 (18%) cases of severe oligohydramnios, 49 (81%) cases of borderline oligohydramnios at 1st visit, while after amino acid infusion, the number of cases of severe oligohydramnios dropped from 11 to 6 (10%) from borderline oligohydramnios, it dropped from 49 (81%) to 33 (55%) and 21 (35%) patients had normal AFI at the time of delivery.

These findings are comparable to the study of Baxi K and Bansali S who concluded that amino acid infusion therapy in 3rd trimester idiopathic oligohydramnios can help to improve AFI thus leading to prolongation of pregnancy and better neonatal outcome¹².

For the mode of delivery, we observed that 42 (70%) patients in our study delivered vaginally with 2 patients in the severe oligohydramnios category, 30 in borderline oligohydramnios, and 10 patients in the normal AFI category. While 15 (25%) patients ended up in caesarean section with 1 caesarean section done for fetal distress, 1 for meconium-stained liquor and 2 for IUGR in severe oligohydramnios category, 4 caesarean sections for fetal distress, 5 for meconium staining, and 2 for IUGR in borderline oligohydramnios category. 1(2%) patient has instrumental vaginal delivery observed in borderline oligohydramnios category and 2 (3.3%) patients in the severe oligohydramnios group had preterm delivery as there was no improvement in liquor volume seen after 2 weeks of amino acid infusions. These findings of our study are in comparison with the one done by Gupta R et al who also reported a higher normal vaginal delivery rate after amino acid infusion and improvement in liquor volume especially in patients with borderline oligohydramnios¹³.

While reviewing the effects of amino acid infusion and the improvement in the amniotic fluid index on perinatal outcome, we found out that 29 (37%) newborns were healthy with 5 in the severe oligo category, 14 in borderline oligohydramnios, and 10 with adequate AFI category. 15 (25%) babies were found to have low birth weight with 8 in severe oligo, 6 in borderline, and only 1 in adequate AFI category. There were 10(16%) NICU admissions with 7 in AFI <5cm, 2 in borderline oligo, and 1 in adequate AFI group. 6(10%) newborns had Apgar score <7 with 5 being in <5cm AFI, and 1 in borderline oligo category. So with an increase in AFI, we observed improved perinatal outcome with decreasing percentages of newborns with low APGAR scores and requiring NICU admission. These observations of our study are comparable to those done by Sunil I et al who also reported better neonatal outcomes with 20% cases of low birth weight, 16% NICU admissions, and 12% newborns with low Apgar scores after amino acid infusion¹⁴.

CONCLUSION

In our research, 35% of the patients after parenteral amino acids infusion had fallen into the adequate liquor category so on the basis of the results of our study we can conclude that in cases of unexplained oligohydramnios developed in the 3rd trimester, intravenous administration of amino acids helps to improve AFI thus prolonging the duration of gestation, avoiding the need for preterm delivery, decreases the chances of lower segment caesarean sections. It also helps to improve the perinatal outcome by decreasing NICU admissions and newborns delivering with a poor Apgar score

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Conflict of interest statement: None

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