

A Prospective Study on Role of IV Amino Acid Infusion in Improving Pregnancy Outcome in Cases of Oligohydramnios

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Abstract: **Background:** It has long been known that oligohydramniosis and fetal growth limitation increase the risk of illness and death in the prenatal, neonatal, and adult stages of life. This has resulted in surgical interventions, perinatal mortality, and morbidity. The amniotic fluid index is a marker of fetal health that changes with gestational age. Amniotic fluid index (AFI) and fetal weight are being researched in relation to various oral and intravenous hydration and amino acid infusion regimens. **Objective:** To investigate how intravenous amino acid infusion affects fetal growth restriction (FGR) and oligohydramnios in pregnancies. **Material and Method:** Pregnant women who satisfied the inclusion and exclusion criteria were registered in the in - patient department (IPD) unit of the Obstetrics & Gynecology department at GCS Medical College and Research Center, Ahmedabad, and divided into two groups of fifty - two each. Group B received IV hydration and serial monitoring was carried out until birth, while Group A had an IV amino acid infusion on a different day. **Result:** In both groups, the mean AFI at admission was observed at 4.1 cm and 4.6cm, case and control respectively. The mean AFI after >2weeks of intervention, in the IV amino acid group was 6.2cm, and 5.2cm in the IV hydration group. And normal delivery rate increases in IV amino acids group than IV hydration group.

Keywords: amniotic fluid index, perinatal outcome, amino acid infusion, fetal growth restriction, oligohydramnios

1. Introduction

During pregnancy, the amniotic cavity that surrounds the developing fetus is filled with amniotic fluid. It is a watery, alkaline fluid that nourishes and shields the developing fetus. The cushioning action of amniotic fluid, which forms a barrier against infection and guards against biological and mechanical harm from shear pressures and forces, is one of its protective qualities. By controlling fetal urine production and excretion, intramembranous absorption, and fetus swallowing, the amniotic fluid helps the fetus maintain homeostasis. In the first trimester, liquor is formed via diffusion through the skin; in the second and third trimesters, the fetal kidneys excrete hypotonic urine, which forms liquor.

When amniotic fluid content is below the minimal amount anticipated for gestational age, it is known as oligohydramnios. About 7 - 8% of pregnancies result in oligohydramnios [1]. Placental insufficiency is one of the causes of oligohydramnios, which can result in fetal growth restriction (FGR) in utero [2]. FGR, which can be caused by a variety of fetal, maternal, external, or placental conditions, causes the fetus to not develop and grow to its full genetic potential. One of the main causes of perinatal morbidity and death, FGR affects around 5–10% of pregnancies [3]. FGR - complicated pregnancies are more frequently linked to fetal discomfort or meconium - stained fluid. They may also result in stillbirth, neonatal problems, and increased rates of neonatal intensive care unit (NICU) visits.

L- arginine is essential for releasing growth hormone, which causes an increase in plasmatic growth hormone after stimulating the growth hormone - releasing hormone [4]. This allows for the achievement of somatic growth. One of the main causes of higher rates of surgical deliveries, perinatal morbidity, and death is oligohydramnios linked to FGR. Although the majority of oral and IV therapies have been shown to be successful, no thorough study has yet been conducted to determine the precise dose and efficacy of any modality. In order to determine the influence of oral vs intravenous amino acid supplementation on the amniotic fluid index and perinatal outcome in instances of oligohydramnios and FGR, the current research was designed.

2. Material and Methods

Study Design and Setting

This prospective study was conducted at the GCS Hospital, Ahmedabad. The study period spanned from July 2023 to June 2024.

100 confirmed cases of oligohydramnios by clinical and sonographic evaluation in the third trimester visiting a prenatal clinic and those referred to wards were divided into two study groups for the purposes of the investigation.

The singleton pregnancy, gestational age between 35 to 40 weeks, amniotic fluid index (AFI) of less than or equal to five.

Inclusion Criteria

- 1) Pregnant women with 24 - 34 weeks of gestational age.
- 2) Amniotic fluid index of <5 cm.
- 3) Intact membranes.
- 4) Patients without true labour pains.

Exclusion Criteria

- 1) Gestational age less than 24 and more than 34 completed weeks.
- 2) Associated fetal malformations.
- 3) Ruptured membranes.
- 4) Medical complications like Diabetes mellitus, Pregnancy induced hypertension, Anemia, Chronic nephritis, Cardiac disease.

Ethical approval was obtained from the institutional review board, and informed consent was obtained from all participants.

Sample Size Calculation

The sample size was calculated based on the oligohydramnios rate in India, aiming for a confidence level of 95% and a margin of error of 5%. $n = [z^2 * p (1 - p)] / e^2$

Where:

- n is the sample size
- Z is the Z - score corresponding to the desired confidence level (for 95%, $Z \approx 1.96$)
- p is the estimated prevalence (proportion) of the condition. Here I took p as 7%
- E is the margin of error (in this case, 5% or 0.05) So, $n = 101$. I took 100 as my sample size.

Data Collection

100 individuals who met the inclusion criteria were admitted to the ward for ongoing observation. Using a predesigned and pretested proforma, detailed information on the socio - demographic characteristics such as age, address, place of residence, socio - economic position, and their menstrual, obstetric, previous, personal, and family history was acquired. Specifics on the current pregnancy were recorded, including the gestational age and any problems that arose. The patient was instructed to lie on his left side during bed rest. There was sporadic oxygen supply. Fetal movement counts were strictly tracked each day. At the time of admission, the patients had an AFI and an estimated fetal weight measured. Following the start of therapy, obstetric ultrasounds were performed.

Throughout the process, the transducer is positioned perpendicular to the mother's coronal plane and parallel to her sagittal plane. An image is captured at the location of one of the clearest, freest, and deepest pockets of amniotic fluid, and it is frozen there. The pocket is then measured vertically by placing an ultrasonic caliper in a virtual line against it [5]. The following four quadrants go through the same procedure, with the pockets being measured vertically and added together to determine the AFI.

To prevent interobserver bias, ultrasonography was performed on the same ultrasonography machine by a designated sonologist. In the supine position, an AFI assessment was conducted utilizing a sector, curvilinear, or linear transducer. The uterus cavity is divided into four

quadrants for the examine.

Patients in Group A were given a 500 ml intravenous infusion of amino acids three times a week. This was followed by two to three weeks of 500 ml dextrose 5% solution treatment. For two to three consecutive weeks, Group B patients received intravenous (IV) fluid (1 - pint 500ml dextrose 5%, 1 - pint 500ml Ringer lactate) on an alternating day.

Statistical Analysis

Statistical analysis was performed using MsExcel version 2019.

Ethical Considerations This study adhered to ethical standards, ensuring the confidentiality and privacy of participants. Informed consent was obtained, and participants were provided with the option to withdraw from the study at any point without consequences. All collected data was anonymized and stored securely to protect participant identity.

3. Result

The study was done at the Obstetrics and Gynecology Department, GCS HOSPITAL Ahmedabad. A total of 100 cases were enrolled for the research after receiving their consent to participate and considering the inclusion and exclusion criteria in pregnancies complicated by oligohydramnios.

Table 1

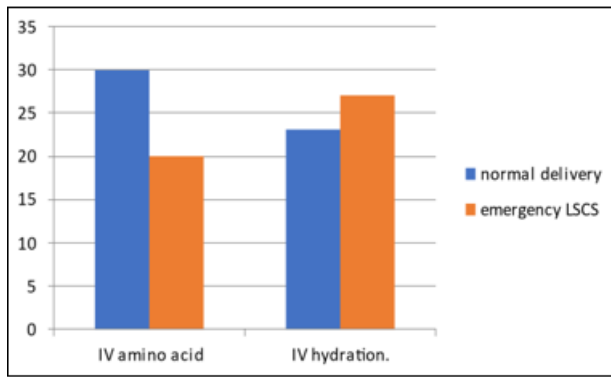
	IV amino acid	IV hydration.
AFI raised	35	10
AFI not effected.	15	40

Table 2

	IV amino acid	IV hydration.
Mean AFI before intervention	4.10	4.6
Mean AFI at time of delivery	6.20	5.1

As shown in table no.1 in both groups, the AFI at admission or before starting treatment was observed and compared with AFI after intervention at the time of delivery. It was noted that in 70% patients AFI increased after IV amino acids and remained unaffected in 30% patients. Whereas AFI was increased in only 20% patients in whom IV hydration therapy and 80% patients remained unaffected.

The mean AFI before intervention was 4.10 and after intervention of IV amino acids, the mean AFI increased to 6.2. Whereas in patients intervened with IV hydration mean AFI increased only upto 5.1 from 4.6.

**Table 3**

	IV amino acid	IV hydration
Normal delivery	30	23
Emergency LSCS	20	27

The graph and table no.3 shows higher number of vaginal deliveries (30) in the IV amino acid infusion group as compared to the IV hydration group (23). The rate of caesarean delivery is (27) in IV hydration group and (20) in IV amino acid group.

Table 4

Neonatal complication	IV Amino acid	IV hydration
LBW	06	10
MAS	04	06
SEPSIS	02	03
HYPOGLYCEMIA	01	02
BIRTH ASPHYXIA	01	02

The most common complication were low birth weight (LBW) and meconium stained liquor (MAS) followed by sepsis, hypoglycaemia and birth asphyxia, LBW was significantly higher in IV hydration group compared to IV amino acid group.

4. Discussion

Oligohydramnios increases perinatal mortality and morbidity by posing a serious risk to the developing fetus and the mother. The primary consequence is ineffective weight gain during pregnancy, which causes FGR. In order to identify oligohydramnios linked to FGR early and implement appropriate correction interventions, it is essential to monitor the amniotic fluid index. In this study, the effects of two groups—the IV amino acid infusion group and the IV hydration group—on the amniotic fluid index and the perinatal outcome were examined. A total of 104 patients were diagnosed with oligohydramnios associated with FGR. This study's observations have been reviewed and contrasted with those from previous investigations.

AFI

The initial AFI scores in the IV amino acids and IV hydration groups at the time of admission were noted. The mean AFI at the time of delivery was comparatively higher in the IV amino acid group as compare to IV hydration infusion group. There is around 70% in AFI in IV amino acids infusion group when given more than 2 doses of IV amino acids within 2 to 4 weeks. Whereas only 20% AFI increment seen after IV hydration group within same time.

Mode of Delivery

A higher number of vaginal deliveries (30) was seen in IV amino acid infusion group as compare to IV hydration group (23) and higher number of emergency cesarean section (27) in IV hydration group as compare to IV amino acid infusion group (20). Higher rate of cesarean section that was mainly due to fetal distress, cord compression, meconium - stained liquor, which was associated with variable deceleration and non - reactive cardiotocography (CTG) due to reduced amniotic fluid volume.

Neonatal Complication

IV hydration group (23) has more NICU admission than IV amino acid group (14). The major underlying factor is uteroplacental insufficiency and the resulting umbilical cord compression. Hence, these are strong indications for the termination of pregnancy with oligohydramnios. The incidence of fetal complication during labour, was considerably lower in the IV amino acid group than in the control group.

5. Conclusion

Improvements in AFI, EFW, and perinatal outcomes with IV amino acid and IV hydration therapy are demonstrated in the current study. Treatment for oligohydramnios can be achieved with an intravenous amino acid infusion, which has a significant favorable effect on the amniotic fluid index. The IV amino acid infusion group exhibited a higher rate of vaginal delivery, a higher baby outcome at birth with a higher appearance, pulse, grimace, activity, and respiration (APGAR) score at one minute and five minutes, as well as fewer newborn problems.

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