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Original Research Article

Effect of hydration therapy on oligohydramnios

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ABSTRACT

Background: Oligamnios is defined as an AFI <5cm, SDP <2cms or an AFI below the 5th centile for the gestational age and is associated with many maternal and perinatal complications. An effective, non-invasive method of increasing AFV is the hydration therapy. The objective of present study was to determine the impact of hydration therapy in patients complicated by oligamnios and to measure the maternal and perinatal outcome in oligamnios corrected by Intravenous hydration therapy.
Methods: It is a randomised control trial done at Government Medical College, Kottayam, Kerala, India from Jan 2012 to May 2013. 136 singleton pregnant females with gestation age >34 weeks with AFI <5 cms were randomised into an Intervention group who receive 1 litre of ringer lactate i.v given daily for 5 days and nonintervention group who were kept under observation by serial ultrasound and antepartum fetal surveillance. All were followed-up till delivery to obtain maternal and perinatal outcomes.
Results: Among the 68 who were given intervention, 61 responded and 7 were non responders. With hydration therapy, mean increase in AFI was 4 cm and minimum duration needed for improvement was one week. Hydration therapy showed significant improvement in the maternal and fetal outcomes. Intravenous route of maternal hydration has the advantage that a fixed amount of fluid can be infused at a relatively constant rate with ensured compliance.
Conclusions: From the study, it was concluded that Hydration therapy is an excellent method to improve AFI in Oligohydramnios and maternal and perinatal outcome.

Keywords: Amniotic Fluid, Amniotic Fluid Index, Fetal growth retardation, Hydration therapy, Oligohydramnios

INTRODUCTION

Amniotic Fluid (AF) is an important part of pregnancy sac and helps fetal development.[1] Amniotic fluid has a number of important functions like development of musculoskeletal system, gastrointestinal tract development, lung development, provides essential nutrients to fetus, protects fetus from trauma, and maintains body temperature and it has bacteriostatic properties.[2]

Amniotic Fluid Volume (AFV) rises to a plateau between 22-39 weeks of gestation reaching up to 700-850 mls, which corresponds to an Amniotic Fluid Index (AFI) of 14-15 cm.[3,4] Evaluation of amniotic fluid by palpation is deceptive, whereas its assessment on ultrasonography (USG) is more reliable.[5] Oligohydramnios occurs in about 1% to 5% of pregnancies at term.[6]

AFI is assessed by ultrasound, using which an AFI of 5.0 cm or less is defined as oligohydramnios.[7] It was added to ante partum testing, to better identify fetuses at higher risk of poor perinatal outcome.[8]

By the second and third trimester, amniotic fluid is produced primarily by fetal urine and is reabsorbed through fetal swallowing, fetal lung and directly by the placenta.[9] Amniotic fluid volume is affected by the status

of maternal hydration and maternal plasma osmolality. Acute oligohydramnios may occur from ruptured membranes.[10,11] Chronic oligohydramnios arises from chronic fluid leakage, pre renal, renal, and post renal causes in the fetus.[12]

Irrespective of the cause, oligohydramnios may be responsible for problems such as malpresentation, umbilical cord compression, concentration of meconium stained liquor, difficult or failed external cephalic version, difficult ultrasound visualisation of fetal parts, pulmonary hypoplasia, fetal heart rate deceleration, increased chance of caesarean section (CS), nonreactive non-stress tests, intrauterine growth restriction (IUGR), congenital abnormalities, postdate pregnancy, and low Apgar scores.[13-16]

Sequelae of chronic oligohydramnios can be fetal demise, pulmonary hypoplasia, facial and skeletal deformities.[17] Because adverse outcomes occur in high-risk pregnancies complicated by low amniotic fluid volume, oligohydramnios commonly prompts labour induction, which increases the incidence of caesarean delivery, particularly for the primiparous woman with an unripe cervix.[18]

Among a number of interventions that have been tried to improve the AFV; bed rest, high protein diet, alanine infusion, 1-deamino-[8-D-arginine] vasopressin, transabdominal and transvaginal amnioinfusion, vesicoamniotic shunt, 10% maltose infusion and oral and intravenous hydration therapy.[19-24] But one that's cost effective, simple to accomplish, with less side effects, which do not require special techniques and successful outcome, is the hydration therapy.

Maternal hydration therapy has been suggested by many authors to restore amniotic fluid volume to its normal range and thereby to reduce the associated perinatal morbidity and mortality.[25,26] Maternal hydration may theoretically increase amniotic fluid volume by causing fetal diuresis and by improving placental perfusion. An effective, non-invasive method of increasing amniotic fluid volume may have several applications in obstetric practice.

Intravenous hypotonic solution significantly increases the hourly fetal urine production.[27] Studies have shown that human fetus can monitor the acute changes in osmolality by increasing the urine production to maintain its fluid homeostasis.[28] Also, hydration increases amniotic fluid in oligamnios but not in patients with normal AFI, and hydration is associated with increase in mean uterine artery velocity.[29]

Intravenous route of maternal hydration is advantageous over oral to increase amniotic fluid volume as intravenous route seems to have the advantage that a fixed amount of fluid can be infused at a relatively constant rate with ensured compliance.[30] Early detection of oligohydramnios and its correction by simple maternal hydration is found to improve perinatal outcome. The objectives of present study were:

- To determine the impact of hydration therapy in patients complicated by oligohydramnios.
- To measure the maternal and perinatal outcome in oligohydramnios corrected by intravenous hydration therapy compared to non-intervention group.

METHODS

It is a randomised control trial done at Government medical college, Kottayam, Kerala, India from Jan 2012 to May 2013, after the approval from ethical committee. Proper informed consent was obtained from all the patients after explaining the benefits of the study.

Inclusion criteria

- Singleton pregnancy
- Well established gestational age
- All medical disorders related to present pregnancy
- Non anomalous fetus
- Intact membranes at the time of selection

Exclusion criteria

- Congenital anomalies
- Intrauterine death
- Multiple pregnancies
- Past date
- PROM and PPROM
- Medical diseases unrelated to pregnancy

136 singleton pregnant females with gestation age >34 weeks with AFI <5 cms were taken up for trial. All patients were submitted for elaborate clinical examination and obstetric examination along with detailed history taking to satisfy the inclusion and exclusion criteria. AFI was assessed sonographically. After obtaining a written informed consent, patients were randomly selected in two groups.

- Intervention group - those who receive hydration therapy (1 litre of Ringer Lactate i.v given daily for 5 days and the response reassessed with ultrasonogram after the treatment).
- Non-intervention group - those who were kept under close maternal and fetal monitoring by serial ultrasound and antepartum fetal survivals.

All of them were followed up till delivery to obtain maternal and perinatal outcomes.

Statistical analysis

Data was initially entered into an excel file and was entered SPSS software data variable. The categorical

variables were analysed by chi square test. Univariable analysis was done and a p value less than 0.05 was taken as statistically significant.

RESULTS

Table 1: Improvement of AFI in both groups.

Improvement	Intervention Group	Non intervention group	Total
Yes	61	6	67
No	7	62	69
Total	68	68	136

Among the 136 females taken up for study, 68 were given hydration therapy and the rest 68 were kept under observation without intervention. 61 among the intervention group showed improvement in AFI whereas among the non-intervention group only 6 had an improvement.

Table 2: Change in the AFI in both groups.

Difference in AFI	Intervention group	Non-intervention group
Mean	4.0081	0.4897
Standard deviation	2.52462	0.88235
t value	13.869	
p value	0.000	

The mean improvement in AFI in the intervention group was 4. From the data collected, analysis was done by paired t test, which showed a t value of 13.869 and a p value of 0.000, which is statistically significant. Hydration therapy therefore is proven to improve AFI in oligohydramnios.

Table 3: Patient characteristics.

	Experimental	Control	test statistic	p
Age	26.5+4.9	27.0+5.0	0.589	>0.05
Gestational age	35weeks 2 days+7.9	35weeks 2 days+9.1	1.4	>0.05
Primi	36 (52.9%)	35 (31.5%)	0.864	>0.05

Table 4: Maternal outcome.

	Experimental	Control	Test statistic	p
Improvement in AFI	61 (89.7%)	6 (8.8%)	88.9	<0.05
Mean difference in AFI	4.0+2.5	0.4+0.8	13.8	<0.05
Spontaneous labour	45 (66.2)	27 (39.7)	9.5	<0.05
Induction needed	23 (33.8)	41 (60.2)	9.6	<0.05
Vaginal delivery	48 (70.6)	20 (29.4)	23.1	<0.001
Instrumental delivery	2 (2.9)	4 (5.9)	0.174	>0.05
Emergency caesarian section	10 (14.7)	29 (42.6)	12.9	<0.001
Deliveries complicated by MSAF	1 (1.5)	14 (20.6)	12.7	<0.001
Abruption	0	3 (4.4)		0.244*

Table 5: Fetal outcome.

	Experimental	Control	test statistic	p
NRFHR	6 (8.8)	31 (45.6)	23.2	<0.001
1'Apgar <6	4 (5.9)	9 (13.2)	2.1	>0.05
IUGR	28 (41.2)	40 (58.8)	10.7	<0.001
RDSAB	3 (4.4)	32 (47.1)	32.3	<0.001
MAS	1 (1.5)	9 (13.2)		0.017*
NICU	6 (8.8)	31 (45.6)	59.1	<0.001
IUD	1 (1.5)	1 (1.5)		1.000*
NND	3 (4.4)	3 (4.4)		1.000

Extremes of maternal age were avoided and preference were given equally to the primi gravidas and multi gravidas from a gestational age of 34 to 40 weeks, avoiding past date pregnancies.

DISCUSSION

At Medical College Kottayam, on an average we have 150 women attending our outpatient clinic daily and

deliveries in the institutions per month ranges from 450-500. The incidence of oligamnios in our hospital was found to be 2.8%. In India, incidence of oligamnios ranges from 1-5%.

Maternal characteristics of the women taken for the study were evenly distributed among the intervention and non-intervention group and outcomes were studied in detail. The most common etiological factor contributing to oligohydramnios was found to be associated with intrauterine growth restriction (50%). Medical disorders contributing to oligohydramnios constituted only 19.8%. Isolated oligamnios constituted 30.2%.

During hydration therapy, we found no changes in maternal vital signs and peripheral venous pressure. No patient discontinued the study because of adverse effects.

IV hydration was given by ringer lactate solution and 89.17 % responded to hydration therapy and 10.29% did not respond. The mean improvement in AFI in the intervention group was 4cm. Present study findings are consistent with the studies conducted by Dor et al, Magann et al, Hofmeyr and Gulmeziglu, Nicola et al and Chandra et al who concluded that IV hypotonic fluid increases AFI in oligamnios.[4,26,31-33] Mean number of days required to increase AFI was 7 days.

Among the intervention group, 66.18% went into spontaneous labour pains (p value of 0.0025) compared to 39.71 % in the non-intervention group. The rest 33.82 % in the intervention group were either induced or taken up for elective cesarean section.

Induction of labour (according to the modified Bishop score) was done for 33.82% of intervention group (p value is 0.0025) and 60.29% of non-intervention group.[34,35] Among the 33.82% induction was done for past date, on date, associated co morbidities like GDM, Gestational Hypertension and IUGR and Doppler abnormalities. In non-intervention group, all were induced for intrauterine growth restriction, oligamnios and associated Doppler abnormalities.

Among the patients who went into spontaneous labour pains, 70.59% were among the intervention group (p value 0.000) and 29.41% were among the non-intervention group. But among the non-intervention group, who had vaginal delivery all were given trans vaginal amnioinfusion during labour, either prophylactically or therapeutically. There was 1 case of assisted breech delivery in the intervention group.

Instrumental delivery was needed in 2.94% of intervention group (p value of 0.50) and 5.88% among the non-intervention group. Of intervention group, one was delivered by ventouse for failure of secondary powers and one by forceps for fetal bradycardia whereas four among non-intervention were delivered by ventouse/forceps for fetal bradycardia.

Elective CS was conducted for 11.77% of the intervention group (p value 0.70) and 10.29% of non-intervention group. Among the intervention group, 6 were previous CS and two were flexed breech. 7 were taken up for elective CS in the non-intervention group for flexed breech (6) and previous CSc (1).

Emergency CS was done for 14.7% of intervention (p value 0.000) and 42.6% of non-intervention. 10 among intervention group were taken up for emergency CS for previous CS and premature rupture of membrane (4), failed induction (4) and NRFHR (2). 29 among the non-intervention group were taken for emergency CS for meconium stained amniotic fluid (14), abruption placentae (3) and non-reassuring fetal heart rate (12).

Meconium stained amniotic fluid was seen in 1.47% of the intervention group (Light MSAF); p value 0.000 and 20.59 % of non-intervention group (2-Light MSAF, 7-Moderate MSAF and 6-Thick MSAF). 10 cases complicated by MSAF in the non-intervention group developed meconium aspiration syndrome and needed resuscitation and supportive care in NICU, except one (died on day 1), all others were discharged after treatment.

Abruptio placentae complicated 0% in intervention (p value is 0.20) compared to 4.41% in nonintervention group. All 3 cases were grade II abruption needing emergency CS.

Non-reassuring fetal heart rate was seen in 8.8% of the intervention (p value 0.000) and 45.6% of the nonintervention. 6 in the intervention group were taken up for emergency CS whereas 12 in the nonintervention group were taken up for emergency CS, 4 were delivered by instruments and rest 15 cases delivered vaginally. All 15 were given intrapartum amnioinfusion following non-reassuring fetal heart rate.

Perinatal asphyxia (1’ Apgar <6) was seen in 5.9% of intervention group (p value 0.10) and 13.24% of non-intervention group. All babies needed neonatal resuscitation. 6 babies died in NICU (3 in each group).

41.2 % of intervention group had low birth weight babies (p value 0.001) and 58.8% of non-intervention group. The IUGR babies in intervention group had a better outcome than the non-intervention group.

Respiratory distress soon after birth was found in 4.4% of intervention (p value 0.000) and 47.1% of non-intervention group needing NICU care.

No cases of Meconium aspiration syndrome were seen in intervention group (p value 0.001) compared to 14.7% in non-intervention group. One baby in the non-intervention died due to meconium aspiration syndrome, two babies were resuscitated and were discharged.

NICU admissions were needed for 8.8% among intervention and 45.59% of non-intervention group (p value 0.000). 6 in the intervention group (non-responders) were admitted in NICU for evaluation and treatment and 31 of the non-intervention, needed NICU admission because of the complications of low birth weight, respiratory distress syndrome and meconium aspiration syndrome.

There were 2 still births, one in each group (p value 0.99). Still born baby in the intervention group was found to have congenital anomaly and that in the non-intervention group, was a premature (35 weeks 5 days) severely compromised fetus with Doppler abnormality.

There were 3 neonatal deaths in each group (p value 0.99). One baby had renal agenesis, one was preterm infant of diabetic mother, and breech and third baby was having severe IUGR, oligamnios and Doppler abnormality. In the non - intervention group, one baby had meconium aspiration syndrome, one baby was having extremely LBW and one baby was having severe IUGR, oligamnios and Doppler abnormality.

CONCLUSION

From the study, it was concluded that hydration therapy is an excellent method to improve AFI in Oligohydramnios and maternal and perinatal outcome. The mean increase in AFI in intervention group was 4 cm. The minimum duration needed to improve AFI was 1 week. Among 68 intervention group, 61 responded to the treatment whereas 7 did not respond, reasons being undetected fetal anomaly, placental insufficiency and oligamnios in irreversible phase. The maternal and perinatal outcomes in the corrected group were also proved to be better than the uncorrected group where the response was poor. By correction of AFI early induction needed for oligohydramnios was avoided. Maternal outcomes in intervention group, with respect to spontaneous labour pain, induction, vaginal delivery, emergency caesarean section and meconium stained liquor, were par excellent compared with non-intervention group, whereas outcomes with respect to instrumental delivery, abruptio placentae and Elective Caesarean delivery were not significant. Perinatal outcomes in intervention group, with respect to non reassuring fetal heart rate, low birth rate, respiratory distress soon after birth, meconium aspiration syndrome, NICU care were excellent compared with non-intervention group, whereas outcomes like 1’ Apgar <6, neonatal deaths and still births were not statistically significant in both groups.

Recommendations

The results of this research recommend promoting hydration therapy with intravenous Ringer Lactate at a dose of one litre on daily or alternate day basis for five days, for treating oligohydramnios. Early detection of Oligohydramnios and its correction by simple maternal hydration is found to improve perinatal outcome by increasing amniotic fluid volume by fetal diuresis and improving placental perfusion. Hydration therapy with intravenous hypotonic solution is a cost effective, easy method of treatment, having fewer side effects and with a successful outcome. Intravenous route of maternal hydration is advantageous over oral to increase Amniotic fluid volume as intravenous route seems to have an advantage that a fixed amount of fluid can be infused at a relatively constant rate with ensured compliance.

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