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Original Research Article

Effect of oral and intravenous hydration therapy on amniotic fluid index, maternal and perinatal outcome in borderline oligohydramnios

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ABSTRACT

Background: The aim was to determine whether oral route of maternal hydration was advantageous over intravenous route in terms of increasing AFI and improving maternal and perinatal outcome in women having borderline oligohydramnios.
Methods: At Aarogya hospital, 150 women in third trimester with borderline oligohydramnios (BO) AFI 5.1-8 cm, were divided randomly into two groups, oral hydration group (OG) and intravenous hydration (IVG). Each case was studied on OPD basis. After 2 hours, 48 hours and 1 week of oral or IV hydration. AFI was reassessed by same sonographer. Pre-delivery AFI and various outcome measures were recorded for both groups.
Results: There was an increase in AFI by 44.5% in OG from 0 hour till delivery as compared to 30.7% increase in IVG. MSL occurred in 8 (10.7%) women in OG compared to 17 (22.6%) in IVG. FD was found in 4 (5.3%) in OG requiring LSCS compared to 16 (21.3%) in IVG. Total of 59 (78.7%) patients in OG has spontaneous vaginal delivery as compared to 42 (56%) in IVG. Perinatal outcome was better with OG than IVG 67 (89%) had Apgar at 1 min >8 in OG than 58 (77%) in IVG. Apgar score <8 at 1 min was seen in 8 (10.7%) in OG while 17 (22.7 %) in IVG. Overall, 7 (9.3%) required NICU admission in OG and 12 (16%) in IVG.
Conclusions: AFI increment persisted longer in OG as compared to IVG. Maternal and perinatal outcome were better with oral hydration therapy than IV hydration.

Keywords: AFI, Hydration, Oligohydramnios

INTRODUCTION

An adequate amniotic fluid volume is an essential requisite for adequate intrauterine development and a good neonatal outcome.[1,2] An amniotic fluid index (AFI), first measured by Phelan's 1987 four quadrant technique, of 5 cm or less is consistent with most sonographic criteria of oligohydramnios and has been used as an indication for delivery of infants at or near term.[3,4] Oligohydramnios has an incidence of 8.5% to 15.5% which increases at 40 weeks and beyond term and is invariably associated with increased rates of perinatal morbidity and mortality and a high rate of surgical delivery and maternal morbidity.[1,2,4]

Oligohydramnios may be caused by fetal urinary tract abnormalities, conditions of uteroplacental insufficiency and fetal growth restriction, drugs and rupture of membranes or can be diagnosed without the presence of any of the causes described above when it is called isolated oligohydramnios.[5-8] Several studies have addressed the relationship between maternal intravascular volume and AF volume and have suggested that oral and intravenous

hydration can increase the AFI in normal pregnancies and in pregnancies with oligohydramnios.[9-11] Perinatal outcome was better with OG than IVG 89% had Apgar at 1 min >8 in OG than 77% in IVG 9.3% required NICU admission in OG compared to 16% in IVG.[12-14] Several management options have been suggested in third trimester oligohydramnios to restore AFV to its normal range namely serial trans-abdominal amnioinfusion, intra-amniotic sealing techniques, desmopressin use and fetal cystoscopy, but all these modalities are costly, need hospitalisation and are associated with serious side effects.[15-18] Hence, maternal hydration was an economic and effective intervention to treat oligohydramnios in the resource poor settings like our country.[19]

Aims and objectives

The aims and objectives were to study and compare the effect of oral and intravenous hydration therapy on the increase in AFI and maternal and perinatal outcome in cases with BO.

METHODS

This prospective interventional comparative study was carried out in department of obstetrics and gynecology, Aarogya hospital, Delhi on 150 women with third trimester BO (5.1-8 cm) who refused for admission and opted for OPD treatment. They were divided randomly into two groups, OG and IVG. The study was carried out during a period of 1 year from 1st April 2019 to 31st March 2020.

Eligibility was determined by inclusion criteria.

Inclusion criteria

Patients with well-established dates at 28-36 weeks gestational age, 20 to 38 years old with 1 to 5 gravidity, AFI of 5.1-8 cm, intact membranes and singleton pregnancy with cephalic presentation were included.

Exclusion criteria

The women at risk of fluid overload such as those with severe anemia (Hb <7 g/dl), cardiac disease, hyperthyroidism, renal impairment and those with severe pre-eclampsia or hypertension, diabetes, ruptured membranes, multiple pregnancy, receiving prostaglandin synthetase inhibitors and congenital anomaly in fetus were excluded.

Method

All the pregnant females in our study diagnosed with BO during third trimester were advised admission for feto-maternal surveillance but when they refused for admission, they were offered OPD treatment with hydration therapy after informed written consent. With the help of USG, AFI was measured immediately before the hydration therapy by technique of Phelan et al by dividing the uterus into four quadrants and summing all four vertical diameters.[3] All the AFI values were recorded on printed proformas. Maternal vital signs were monitored strictly during the fluid therapy. Each case was given oral or intravenous hydration for 2 hours during OPD between 9 am to 12 noon. Once basal AFI was taken, every woman in the OG was instructed to drink 250 ml of water every 15 minutes for total of 2 litre in 2 hours and every woman in the IVG was infused 2 litre of hypotonic fluid (Ringer lactate) in the same 2 hour duration. After 2 hours, 48 hours and 1 week of oral or IV hydration, the AFI was reassessed by the same sonographer. Throughout the study, the cases were advised to have routine oral intake of fluids, Argipreg sachet daily and to had rest, DFMC, high protein diet and regular check-up for fetal wellbeing. They were advised to get re-admitted at their expected date of delivery or the appearance of labour symptoms, whichever was earlier.

Management protocol was similar in both the groups and was individualized based on factors such as parity, cervical ripeness and patient's preference. All patients were monitored by periodic or intermittent auscultation of fetal heart rate in labour. The nature of amniotic fluid was noted at artificial rupture of membranes. Non-reassuring fetal status with or without meconium stained liquor which persisted inspite of corrective measures like change in maternal position, hydration, oxygen inhalation and stopping oxytocin was managed by LSCS or forceps delivery. All newborns were attended by neonatologists. Various outcome measures recorded for both the groups were: induced versus spontaneous labor, gestational age at delivery, nature of amniotic fluid, FHR changes, mode of delivery, indication for cesarean section or instrumental delivery, Apgar score at one minute and five minutes, birth weight, admission to neonatal ward, perinatal morbidity and perinatal mortality.

All data including demographic data, characteristics of the women with oligohydramnios and sonographic indices, before and after the hydration therapy were recorded on prepared data collection forms.

Statistical analysis

The data was entered in statistical package for social science (SPSS) software programme and analyzed using chi square test.

RESULTS

The two groups were similar with regards to antepartum variables, that is, maternal age, gravidity, parity, gestational age and antenatal complications. There was an increase in AFI by 44.5% in OG from 0 hour till delivery as compared to 30.7% increase in IVG. MSL occurred in 8 (10.7%) women in OG compared to 17 (22.6%) in IVG. FD was found in 4 (5.3%) in OG requiring LSCS compared to 16 (21.3%) in IVG. Total of 59 (78.7%) patients in OG had spontaneous vaginal delivery as

compared to 42 (56%) in IVG. Perinatal outcome was better with OG than IVG 67 (89%) had Apgar at 1 min >8 in OG than 58 (77%) in IVG. Apgar score <8 at 1 min was seen in 8 (10.7%) in OG while 17 (22.7%) in IVG. Overall, 7 (9.3%) required NICU admission in OG and 12 (16%) in IVG.

Table 1: Demographic profile of isolated oligohydramnios cases.

Parameters	Classes	No. of cases (n=150)	Percentage
Age (years)	20-25	42	28.0
	25-30	82	54.7
	>30	26	17.3
Gravidity	1	76	50.7
	2	41	27.3
	3	25	16.7
	4	6	4
	5	2	1.3
Education status	Till intermediate	88	58.7
	Graduate and above	62	41.3
Socioeconomic status	Low middle	49	32.7
	Middle	71	47.3
	High	30	20.0

Table 2: Post-hydration AFI changes in two groups.

Mean 0 hr AFI	Mean 2 hr AFI	Mean 48 hr AFI	Mean 1 week AFI	Mean Pre-delivery AFI	ΔAFI_1 (48 hr-0 hr)	ΔAFI_2 (Pre-delivery 0 hr)
OG						
5.21±0.74	6.21±1.17	7.24±1.09	8.79± 1.03	9.39±0.96	2.03	4.18
IVG						
5.13±0.83	6.4±1.04	7.18±1.09	7.33 ±1.12	7.41±1.20	2.05	2.28

Table 3: Intrapartum complications in two groups.

Intrapartum complications	OG		IVG	
	No. of cases	%	No. of cases	%
MSL*	8	10.7	17	22.6
FD†	4	5.3	16	21.3
NPOL‡	4	5.3	6	8
Abruption	0	0	1	1.3
None	59	78.7	35	46.6
Total	75	100	75	100

Overall, X^2=39.776, p≤0.0001, significant; for MSL ,X^2=10.169, p=0.0014, significant; for FD, X^2=29.329, p=0.0001, significant; for NPOL and abruption, X^2=0.434, p=0.58, not significant; *MSL=meconium stained liquor; †fetal distress; ‡NPOL=non progress of labour.

Table 4: Mode of delivery in two groups.

Mode of delivery	OG		IVG	
	No. of cases	%	No. of cases	%
Spontaneous vaginal	59	78.7	42	56.0
Forceps	03	4.0	08	10.7
LSCS for FD	04	5.3	16	21.3
LSCS for other indications	09	12	09	12
Total	75	100	75	100

X^2=14.29, p=0.002, significant.

Table 5: Perinatal outcome in two groups.

Parameters	OG	IVG	P value
	N (%)	N (%)	
Birth weight <2.5 kg	15 (20)	17 (22.7)	0.2315
Apgar score at 1 min			
<8	8 (10.7)	17 (22.7)	0.048
>8	67 (89.3)	58 (77.3)	
Apgar score at 5 min			
<8	7 (9.3)	9 (12)	0.596
>8	68 (90.7)	66 (88)	
NICU admissions	7 (9.3)	12 (16)	0.1908
C PAP/ventilatory support	4 (5.3)	7 (9.3)	0.347

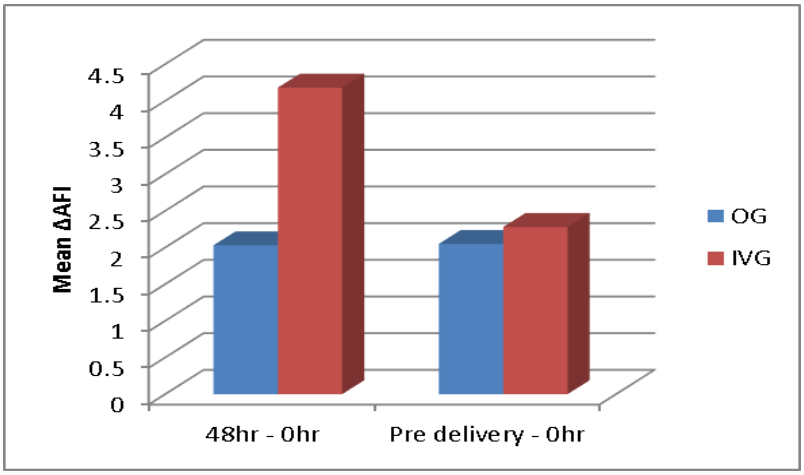

Figure 1: Amniotic fluid volume increase in oral and intravenous groups.

DISCUSSION

Amniotic fluid is essential for the normal growth and wellbeing of the fetus. Various studies have assessed and compared the effect of oral and intravenous maternal hydration on amniotic fluid volume in cases with oligohydramnios, but none have compared the maternal and perinatal outcome in the two groups. This study was unique in that regards. In the present study, the mean age for all the oligohydramnios cases was 25.96 years comparable to the study by Casey et al (23.9 years) and Jagatia et al (23.6 years).[5,6] Maximum number of cases (82%) in this study were in 21-30 years age group comparable to the study by Seth et al (77.3%).[7] Maximum patients in this study were primigravidae (50.7%) similar to the study of Garmel et al (67%) and Jandial et al (60%).[8,9] Majority (58.7%) of the cases in our study belonged to the less educated group, comparable to the study of Seth et al (60%) (Table 1).[7] In the present study, mean pre-hydration AFI for OG was 5.21±0.74 at 0 hour which increased to mean post-hydration AFI of 6.21±1.17 at 2 hour and 7.24±1.09 cm at 48 hours suggesting that oral hydration increased the amniotic fluid very fast starting within 2 hours and was maintained till 48 hours. Similarly, mean pre-hydration AFI for IVG was 5.13±0.83 at 0 hour which increased to mean post-hydration AFI of 6.4±1.04 at 2 hour and 7.18±1.09 cm at 48 hours. This increase in AFI in 48 hours was similar in both the groups. These findings were very much similar to those of Seth et al (2014) in which a total of 9% women had severe oligohydramnios before hydration while at 24 hours later, no woman was having AFI <5 with maximum number of cases (31%) being in AFI range 7-8.[7] Mean pre-hydration AFI was 5.75±1.59 at 0 hour which increased to mean post-hydration AFI of 6.09±1.65 cm at 3 hour and 7.41±1.46 cm at 24 hours. Continuation of therapy further increased the AFV and at 48 hours, mean AFI was 8.06±1.55 cm. Except for the 3-hour change (p=0.0836), both 24 hour and 48 hour mean AFI was significantly improved (p<0.0001) from base line AFI with 95% confidence. In our study, the ΔAFI1 (mean AFI at 48 hour-mean AFI at 0 hour) for OG and IVG was 2.03 and 2.05 cm respectively which was nearly same. The ΔAFI_2 (mean AFI pre-delivery-mean AFI at 0 hour) for OG and IVG was 4.18 and 2.28 cm respectively suggesting that change in AFI from pre-treatment to post-treatment persisted till delivery to a greater extent for OG (Table 2).

The amniotic fluid was meconium stained in 8 (10.7%) in OG compared to 17 (22.6%) women in IVG. Similarly, fetal distress was found in only 4 (5.3%) cases in OG compared to 16 cases (21.3%) in IVG, the difference being statistically significant. Meconium stained liquor was seen in 48% of women by Jandial et al (2007), 40% by Yousseff

et al (1993) in their studies on oligohydramnios cases while we found it in 23.3% of all our cases, 11.3% being thick and 12% thin meconium stained during labour.[18] This signified the reduction in the incidence of MSL after hydration therapy. In the present study, in IVG, 83.3% cases having AFI ≤5 had FD while none with normal AFI had FD (Table 3). These figures were similar to those found in the study by Rashid et al (2014) who showed that out of 100 patients only 12% patients developed FD with AFI score ≥5 after oral hydration therapy (OHT) while 83% developed fetal distress with AFI score <5 (p=0.0001).[17] In the present study 59 cases (78.7%) patients in OG had spontaneous vaginal delivery and hence better maternal outcome compared to 42 cases (56%) patients in IVG. More interventions including LSCS (17.3%) OG and (33.3 %) IVG and forceps delivery 4% OG and 10.7% were required in IVG. Compared to the OG and the relation between the two methods was found to be statistically significant. About 16 cases (21.6%) of cases underwent LSCS for fetal distress in IVG compared to a mere 4 cases (5.3%) cases in OG (Table 4). In another study by Seth et al 2014 women with AFI <7 required caesarean in 26/35 cases (74%) compared to 29/75 (38.6%) in AFI >7 category.[7] Similarly, Rashid et al 2014 observed that there were significantly higher number of vaginal deliveries in patients with ≥5 AFI after OHT as compared to patients with <5 AFI.[17] In our study, Apgar score <8 at 1 min was seen in 8 cases (10.7%) in OG while 17 (22.7% in IVG) of women which was statistically significant (Table 5), consistent with the findings of Seth et al 2014 who found that 96% of babies had Apgar <7 in severe oligohydramnios group (AFI ≤5) while only 32% in cases with decreased liquor group (AFI 6-8).[7] Similar results were shown by Jandial et al.[18] A study by Grubb et al found the 1 min Apgar score <7 in 84% patients with AFI ≤5 as compared to 14% in the normal AFI group, which was highly significant (p=0.01).[19] In IVG, 12 neonates (16%) were admitted to NICU while only 7 (9.3%) in OG (Table 5). However, the difference in the two groups was not statistically significant. The overall incidence of NICU admission was found to be 18.5% by Garmel et al 1997 which was almost comparable to our study (12.7%).[8] There were 11 neonatal admission requiring C-Pap or ventilatory support. OG had 4 (5.3%) while IVG had 7 (9.3%). However, the difference in the two groups was not statistically significant. The various caused for ventilatory support included moderate and severe birth asphyxia and hypoxic ischaemic encephalopathy. The overall incidence of 11/150 was almost similar to the study by Seth et al who found no intrapartum deaths but 10/110 (9.1%) ventilatory support due to different perinatal complications in NICU in first week of birth.[7] The incidence was almost comparable with 10% of Jandial et al and 6.4% of Casey et al.[5,18]

Limitations

This study had limitations for the female pregnant patient who refused for admission adopted for the OPD treatment so there was to OG and intravenous groups who refused adopted for OPD treatment. The IVG also had short admission in the casualty department for the intravenous fluid to be given at each visit.

CONCLUSION

Our results have demonstrated that women with post-hydration (oral/intravenous) improved to AFI 8-9 and above had higher vaginal delivery rate, better Apgar score at birth at 1 minute and lesser NICU admissions. The AFI increment persisted longer in oral as compared to IV group. The maternal and perinatal outcome were better with oral hydration therapy than IV route. Additional benefits of preferring oral hydration over intravenous method are: water is cheaper, easily available, patient can be easily managed at home on OPD basis, treatment is non-invasive, has no contra-indications and no complications like that of fluid overload or thrombophlebitis, therefore better compliance. Oral hydration is therefore recommended for treatment of oligohydramnios.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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