Original Research Article

Impact of oligohydramnios on maternal and perinatal outcome: a comparative study

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ABSTRACT

Background: Oligohydramnios has got significant impact on perinatal outcome and maternal morbidity. Therefore, early detection and its management will help in reduction of perinatal morbidity and mortality, decreased operative interventions. Hence, the present study is undertaken to study the impact of oligohydromnios on perinatal-maternal outcome.

Methods: The present study was prospective comparative observational study conducted in the Department of Obstetrics and Gynaecology, Mallareddy Narayana Multispecialty Hospital, reputed teaching hospital from January 2015 to August 2017. The women were divided into study and control groups based on AFI, 100 cases were selected in each group.

Results: Out of the 200 women, included in the present study, in study group AFI <5 cm was present in 51% of patients and AFI 5-8 cm in 49% of patients. Doppler abnormalities found in study group (n = 33). 32% of the patients in study group had non-reactive NST while in control group 8%. Caesarean section was performed in 70% of cases in study group as compared to 9% in control group. Foetal distress was the most common indication for LSCS. There were no perinatal deaths in this study.

Conclusions: In this study amniotic fluid index of ≤5 cm was commonly associated with increased cesarean section rates, intrauterine growth restriction, Non-reactive NST and abnormal umbilical artery Doppler velocimetry studies. Hence, every case of oligohydramnios needs to be evaluated carefully, early detection and initiation of appropriate treatment and treat the cause if possible.

Keywords: Amniotic fluid index, Non stress test, Oligohydromnios, Perinatal outcome

INTRODUCTION

Successful outcome of obstetric wellbeing is assessed by obtaining healthy mother and child in modern obstetrics.[1] Amniotic fluid provides a protective milieu for the growing foetus, cushioning it against mechanical and biological injury and allows proper growth and development. Clinical assessment of amniotic fluid volume at outpatient department itself is an initial step to identify high risk pregnancy and foetal wellbeing as variation in its amount has been related to a variety of pregnancy complications.[2] The amniotic fluid volume estimation is the summation of influx and efflux of fluid within the amniotic space. Amniotic fluid volume can be measured by different methods; most commonly used being amniotic fluid index (AFI) evaluation using ultrasonography. Ultrasonography is a non-invasive test, can be applied on a large scale and can be used frequently for repeated amniotic fluid volume estimation. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of foetal wellbeing, especially in the third

trimester.[3] Phelan et al described amniotic fluid estimation by Amniotic fluid Index (AFI) through transabdominal ultrasonography using four quadrant techniques.[4] Abnormalities of the AFV have been associated with adverse pregnancy outcomes.[5,6] A drastic reduction in its quantity may indicate underlying placental insufficiency, which has definite implications on growing fetus. Phelan et al, Baron et al and Kwon et al defined oligohydramnios as AFI less than or equal to 5 cm and 5.1 to 8 as Borderline or marginal oligohydramnios.[4,6,7] By quantification of amniotic fluid volume, better identification of foetus at high risk can be done. Oligohydramnios is caused by pregnancy induced hypertension (PIH), congenital anomalies like renal agenesis, idiopathic; postdate pregnancy, infections, etc. Many studies have established that oligohydramnios is correlated with increased risk of congenital abnormalities, intrauterine growth retardation, meconium aspiration syndrome, low APGAR scores, severe birth asphyxia such as fetal distress and still births and increased incidence of caesarean section.[8-10]

Hence, Oligohydramnios has got significant impact on perinatal outcome and maternal morbidity. Therefore, early detection and its management will help in reduction of perinatal morbidity and mortality at one end and decreased operative interventions at another end. Hence, the present study is undertaken to study the impact of oligohydromnios on perinatal-maternal outcome.

METHODS

The present study was prospective comparative observational study conducted in the Department of Obstetrics and Gynaecology, Mallareddy Narayana Multispecialty Hospital, reputed teaching hospital from January 2015 to August 2017.

Women attending the outpatient department and labour room at or after 37 weeks of gestation with singleton pregnancy, intact membranes, sure about gestation age was calculated by LMP in patients with regular cycles or by first trimester USG, without known uterine anomalies and having AFI measurement within 3 days of delivery included in this study. Women with congenital malformation, previous caesarean section, medical disorder like cardiac disease, intrauterine death of the foetus, multiple pregnancy, premature rupture of membranes and post-dated pregnancy were excluded from this study. The women were divided into study and control groups based on AFI. For present study 100 cases selected in each group after fulfilling above criteria.

- Study group: AFI: <8
- Control group: AFI: 8-15

A written and informed consent was taken from all the study participants. A detailed history and thorough clinical examination was done on admission. Base line investigations, ultrasound examination was performed on

all the subjects. Phelan method of four-quadrant technique was used for measurement of AFI. If the woman did not deliver within 3 days of ultrasound, a repeat ultrasound for measuring AFI was done. Once oligohydramnios was confirmed by measuring AFI, routine management in the form of rest in left lateral position, oral and intravenous hydration was given and simultaneously evaluated for underlying etiological factor and corrected if identified. Ante partum foetal surveillance was done by USG, NST, modified Biophysical profile and Umbilical Artery (UA) Doppler studies were also done if required at the same time.

Considering history, depending upon clinical assessment, Ante partum foetal surveillance reports, investigations and other obstetric factors were deciding factors for labour induction and elective/emergency caesarean section. Patients with spontaneous onset of labour were monitored with cardiotocography in the intrapartum period. Eventually, cases were analysed for maternal and perinatal outcome. Maternal outcome measured in the form of spontaneous onset /induced labour, mode of delivery, labour related events like non-reactive NST (abnormal fetal heart rate), and indication for emergency LSCS were studied. Perinatal outcome in the form of Apgar score at 1 min and 5 min, liquor status (meconium staining), IUGR, birth weight and NICU admission were studied.

RESULTS

Mallareddy Narayana Multispecialty Hospital is one of the few tertiary care centres in Quthbullapur municipality, semi urban area. So many cases nearby localities were referred to this centre.

Table 1: Demographic characteristics in study and control groups.

Characteristics	Study group	%	Control group	%
Maternal age (years)				
<20	28	28	29	29
20-30	70	70	68	68
>30	2	2	3	3
Religion				
Hindu	88	88	90	90
Muslim	12	12	10	10
Booked	44	44	83	83
Unbooked	56	56	17	17
Gravidity				
Primigravida	73	73	68	68
Multigravida	27	27	32	32
Gestational age (weeks)				
37-38	16	16	8	8
38-40	84	84	92	92
AFI				
<5	51	51	-	-
5-8	49	49	-	-

The study participants in both study and control group were compared in terms of age, religion, gravidity, booking status and period of gestation.

Table 2: Associated obstetrics risk factors.

Risk factors	Study group	%	Control group	%
Isolated oligohydromnios	15	15	-	-
Severe anemia	18	18	10	10
Pre-eclampsia	16	16	8	8
Gestational diabetes	2	2	-	-
Hypothyroidism	11	11	7	7
IUGR (Intra uterine growth restriction)	17	17	8	8
Placental abruption	6	6	-	-
Fever complicating pregnancy	2	2	-	-

More than one risk factor presents in one patient.

Table 3: Mode of delivery in study and control groups.

Mode of delivery	Study group N = 100	%	Control group N = 100	%	p-value
Vaginal delivery	29	29	88	88	<0.0001
Instrumental vaginal delivery	1	1	3	3	0.312
Emergency LSCS	59	59	9	9	<0.0001
Elective LSCS	11	11	0	0	0.013

LSCS: Lower uterine segment caesarean section

Table 1 was showing demographic characteristics in both groups. Out of the 200 women, included in the present study, in study group AFI <5 cm was present in 51% of patients and AFI 5-8 cm in 49% of patients. Table 2 showing associated maternal risk factors. Placental insufficiency is the main underlying mechanism for the development of oligohydromnios in study group. Figure: 1 showing Doppler abnormalities in study group (n=33). 32% of the patients in study group had non-reactive NST while in control group 8% had non-reactive NST. Table 3 showing mode of delivery in study and control groups.

Caesarean section was performed in 70% of cases in study group as compared to 9% in control group. A chi square statistic test was applied to know the significance of correlation between mode of delivery and AFI, p value was less than 0.0001; this indicated the presence of a very strong and significant correlation between the AFI and mode of delivery.

Table 4: Distribution of indications for caesarean section in study and control groups.

Indications for caesarean section	Study group n=70	%	Control group n=9	%
Foetal distress	32	45.71	8	88.89
Malpresentation (breech)	4	5.71	-	-
Failed induction	12	17.14	-	-
Non-progress of labour	3	4.28	1	11.11
Cephalo pelvic disproportion	3	4.28	-	-
Absent diastolic flow	11	15.7	-	-
Reversal of diastolic flow	5	7.1	-	-

Table 4 shows distribution of indications for caesarean section in study and control groups. Foetal distress was the most common indication for LSCS.

Table 5: Perinatal outcome.

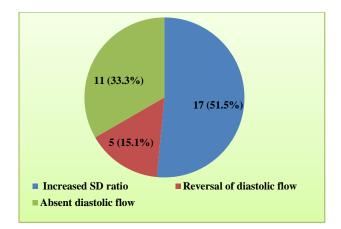| Perinatal outcome	Study group, N = 100	%	Control group, N=100	%	p-value
IUGR	32	32	8	8	0.0001
Apgar					
<7 at 1 min	34	34	17	17	0.006
<7 at 5 min	21	21	9	9	0.017
Non-Reactive NST	32	32	8	8	<0.0001
Meconeum stained liquor aspiration	31	31	13	13	0.002
NICU Admission	23	23	16	16	0.212
Induction of labour	32	32	8	8	<0.0001

Figure 1: Doppler abnormalities in study group (n=33).

Table 5 shows perinatal outcome. There were no perinatal deaths in this study. Among neonatal outcomes, induction of labour, meconeum stained liquor aspiration, non-reactive NST and Apgar score <7 at 1 min in study group were statistically significant (p <0.01).

DISCUSSION

Many studies have proven that oligohydramnios is correlated well with increased risk of Maternal morbidity, perinatal morbidity and mortality. Estimation of amniotic fluid volume is an integral part of antenatal foetal surveillance.[11] Majority of study participants were in age group between 20-30 years. Demographic factors like age, parity, religion and gestational age were comparable in both groups. In present study 56% of cases in study group and 27% of cases in control group were unbooked. While in Mathuriya G et al study 88% in study group, 68% in control group were unbooked. The incidence of oligohydramnios was 73% in primigravida in present study.[12] Kaur P et al, found that the incidence of oligohydramnios was 60% in primigravida which is comparable to the present study.[13] Medical disorders like pre-eclampsia, hypothyroidism were risk factors to cause oligohydromnios in this study. Chronic placental insufficiency is the main underlying mechanism, leading to oligohydramnios. In present study pre-eclampsia was seen in 18% cases in study group and 8% of cases in control group. In Chate P et al study hypertensive disorders found in 8% of oligohydromnios cases only.[14] Abruptio placenta was observed in 6% of present study and similar incidence was reported by Chandra P et al (7.69%).[15] Hypothyroidism (14.6% versus 11%) was seen in study group by Vidyasagar V and Chutani N and present study.[16]

Induction of labour was seen 32% of women with low AFI in study group as compared to control group 8% (chi square test: 9.56 and p value:0.002). Similar to Singhal SR et al study significantly higher induction of labour was seen in low AFI group 72% as compared to control group 12%.[17]

The most common indication for LSCS was foetal distress followed by failed induction and Ultrasound Doppler abnormalities in study group. While in control group foetal distress followed by non-progress of labour. In present study study group underwent LSCS in 70% of cases, while in control group 9% undergone LSCS (chi square test: 77.85 and p value: 0.0001). Similar to Mathuriya et al study 65% of the study cases and only 10% of controls underwent LSCS.[12] 90% of the controls were delivered vaginally in both studies.

In Ranjita G et al study caesarean section rate was 54% in the oligohydramnios group as compared to control group 26%.[18] Chaudhary R et al study reported 51% underwent LSCS in cases, while 22% underwent LSCS in controls.[19]

Controversies encountered in relation to oligohydramnios and meconium-stained amniotic fluid. In present study induction of labour, non-reactive NST, meconium stained liquor aspiration, IUGR and 1 min Apgar score <7 were statistically significant difference found between study and control groups.

Table 6: Perinatal outcome in different studies.

Studies	Non-reactive NST		NICU admission		IUGR		Meconeum stained liquor	
	Study	Control	Study	Control	Study	Control	Study	Control
Ranjita G et al	42%	15%	28%	18%	62%	25%	18%	12%
Bhagat et al	32%	9.7%	36%	24%	56%	21.7%	16%	14.9%
Bachhav AA et al	65%	24%	33%	10%	30%	11%	18%	1%
Sangeetha K	10%	0%	68%	50%	-	-	18%	8%
Present study	32%	8%	23%	16%	17%	8%	31%	17%

Outcomes like meconium stained liquor, 1-min Apgar score <7, IUGR and admission to NICU were not statistically different in the oligohydramnos group from the normal group in Ranjita et al study. NICU admissions

in study group were 15% in cases and 11% in controls in Chaudhary R et al study.

In present study birth weight <2.5 kgs observed in 32% of cases in study group compared to 8% in control group (p value = 0.0001). Bhagat et al in their study found that 56% neonate in low AFI group had birth weight less than 2.5 kg as compared to 21.7% in control group.[20] In contrast to the present study, Sultana et al in their study observed that the difference in low birth weight was not significant between the two groups of AFI (p value=0.4).[21]

Table 7: AFI as a screening test to detect foetal distress.

Groups	LSCS	Vaginal
Study	70 (a)	30 (b)
Control	9 (c)	91 (d)

Sensitivity: ×100 = ×100 = 88.60% Specificity: ×100 = ×100 = 75.20%; Positive predictive value: ×100 = ×100 = 70%; Negative predictive value: ×100 = ×100 = 91%

Table 7 shows AFI as a screening test to detect foetal distress. AFI <8 cm as a screening test in predicting fetal distress during labor requiring LSCS, has a sensitivity of 88.6%, specificity 75.2%, positive predictive value 70% and negative predictive value of 91%.

In Kaur P et al study AFI in study cases as a screening test in predicting foetal distress during labour requiring LSCS, has a sensitivity of 68%, specificity 60%, positive predictive value 48% and negative predictive value of 78%.[22] A test with high sensitivity and negative predictive value makes it a good screening test. Variations in incidences of perinatal and maternal outcome could be because of differences in the selection criteria, the selection of cases for the study and chosen design for the sample size.

CONCLUSION

Amniotic fluid volume is a predictor to identify pregnancies at risk of poor perinatal outcomes and its decrease is associated with increased risk of perinatal morbidity and mortality. In this study amniotic fluid index of ≤ 5 cm was commonly associated with increased caesarean section rates, intrauterine growth restriction, Non-reactive NST and abnormal umbilical artery Doppler velocimetry studies. Hence, every case of oligohydramnios needs to be evaluated carefully, early detection and initiation of appropriate treatment and treat the cause if possible. Proper parental counselling and individualized decision to be taken according to the case regarding timing and mode of delivery, continuous intrapartum foetal monitoring and good neonatal care for optimum perinatal outcome. However, multicentric randomized controlled trials are needed to define at what threshold levels of AFI to predict adverse perinatal outcome and guide management accordingly.

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