IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 6 Ver. VI (June. 2017), PP 112-116
www.iosrjournals.org

A Prospective Clinical Study to Assess Amniotic Fluid Volume And Its Correlation with Mode of Delivery And Perinatal Outcome

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Background: *Amniotic fluid abnormalities have an influence on maternal and perinatal outcome. This study was undertaken to see effect of amniotic fluid volume determined by USG on mode of delivery and perinatal outcome.*
Aim : *To assess amniotic fluid volume and its correlation with mode of deliveryand perinatal outcome*
Materials And Methods: *A prospective study was done on 200 patients. Ultrasonography was done in third trimester for AFI and congenital malformations. 100 patients with AFI <5 and AFI >24 were taken in study group and 100 patients with AFI 5 to 24 were taken in control group. Careful fetal heart rate monitoring with artificial rupture of membrane during active stage was done. Mode of delivery and perinatal outcome was subsequently looked for.*
Results: *Out of 100 patients in study group 79 patients had AFI <5 and 21 patients had AFI >24. Abnormalities in AFI were associated with more number of congenital malformations. CNS was maximally involved in polyhydranmnios whereas genitourinary system had a larger share in oligohydramnios. The study group had more number of labour inductions, LSCS, fetal distress, low 1 and 5 minute APGAR scores, NICU admissions, meconium aspiration, respiratory distress and perinatal deaths as compared to control group.*
Conclusion : *Proper antenatal care, detection of abnormalities of AFI and congenital malformations by ultrasonography with timely intervention can significantly reduce maternal morbidity and perinatal mortality.*
Keywords: *AFI, Congenital malformation, Mode of delivery, Perinatal outcome, MAS, LSCS*

I. Introduction

Amniotic fluid is a clear, slightly yellowish fluid that surrounds the fetus and is contained in amniotic sac. 1t provides sterile environment for fetus, regulates temperature, avoids external injury and reduces impact of uterine contractions. The volume of amniotic fluid varies with gestational age of fetus. Dynamic interactions among fetal, maternal and placental compartments control its volume.[1]Imbalance of this process can lead to oligohydramnios and polyhydramnios which may result from abnormal fetal or maternal conditions. Maximum amniotic fluid volume is at 36-37 weeks. Amniotic fluid index (AFI) and single deepest pocket (SDP) are commonly used to assess amniotic fluid volume. Both indices are most commonly used for abnormalities like polyhydramnios (SDP>8cm or AFI>25cm), and oligohydramnios (SDP<2cm or AFI<5cm).[2] Amniotic fluid volume is an integral part of antenatal ultrasound.

Polyhydramnios is defined as SDP of equal or more than 8cm[3] or AFI of equal or more than 24cm[4] or AFI above the 95th centile for gestational age. It can be mild, moderate or severe according to AFI, 24-29.9cm, 30-34.4cm and 35cm or more respectively.[5]Using SDP mild is 8 to 9.9cm, moderate is 10-11.9cm and severe hydramnios , greater or equal to 12cm. It may be sudden or gradual in onset. Incidence of polyhydramnios is about 1-2% of pregnancies. Congenital malformations are more likely in polyhydramnios and may involve any organ system. More commonly these malformations are found in systems that involve absorption of fluids and swallowing in fetus.[7-8] Anomalies are primarily associated with CNS and gastrointestinal tract.[9-13]

AFI of less than or equal to 5cm defines oligohydramnios, as originally described by Phelan et al.[14] It can also be diagnosed by single deepest pocket of amniotic fluid less than or equal to 2cm. Oligohydramnios complicates 1-2% of all pregnancies. Decreased amniotic fluid especially in third trimester is associated with fetal risks like intrauterine growth restriction and still births. Longer duration of oligohydramnios can lead to pulmonary hypoplasia, abnormal chest wall compliance, limb deformities and contractures. Congenital urinary tract obstruction can also lead to oligohydramnios. There is increased risk for labor induction, caesarean delivery for fetal distress and low APGAR score.

II. Materials And Methods

This prospective study was conducted at the department of Obstetrics and gynecology, PBM Hospital, Sardar Patel Medical College and Associate Group of Hospitals, Bikaner Rajasthan.

The study was conducted from January 2016 to December 2016. Our analysis included a total of 200 antenatal women, both booked and un-booked. After taking written and informed consent and fulfilling the inclusion criteria, women were included in study. Study included antenatal women in their third trimester admitted in labour room. Detailed antenatal history including presence of high risk factors like diabetes, HTN etc. was elicited from the patient, then they were clinically examined and subjected to ultrasonography. Amniotic fluid index and any gross malformations were determined by ultrasonography. 100 Women with Amniotic Fluid Index <5 and > 24 were included in study group. Another 100 women with AFI 5-24 were included in control group

Inclusion Criteria

1. Antenatal patients in third trimester.
2. Intact membranes
3. Singleton pregnancies with ultrasonography showing AFI <5 and AFI>24.

Exclusion Criteria

1. Multiple gestations.
2. Premature rupture of membranes.
3. Pregnancy before third trimester.

Labour was either spontaneous or induced in both study and control group. During labour intermittent auscultation of fetal heart rate was done to detect any signs of fetal distress. Artificial rupture of membranes in active phase of labour was done to get an idea about color of liquor. Mode of delivery and intrapartum complications were noted. Birth weight was recorded and perinatal outcome was assessed using 1 minute and 5 minute APGAR score, NICU admission and perinatal death. Chi square test was carried out at 5% level of significance to analyse the data for final outcome.

III. Observation Tables And Results

Out of 100 cases in study group 79 cases had AFI <5 and 21 patients had AFI >24.Both study and control groups were comparable. Following observations were made:

Table 1: Total Number of Normal and Anomalous Fetuses

Fetuses	STUDY GROUP n=100	CONTROL GROUP n=100
Normal	88	100
Anomalous	12	0
X^2 =10.727		
P Value=0.001		

Abnormalities in AFI were associated with congenital malformations in 12% of cases.

Table 2: Congenital Malformations in Polyhydramnios & Oligohydramnios in Study Group

Congenital Malformations	AFI<5 n=6	AFI>24 n=8
Anencephaly	0	4(50%)
Oesophageal Atresia	0	1(12.5%)
Duodenal Atresia	0	1(12.5%)
Omphalocele	1(16.67%)	0
Hydrocephalus	1(16.67%)	0
Holoprosencephaly	0	1(12.5%)
Hydronephrosis	3(50%)	0
Gastroschisis	1(16.67%)	0
Anal Atresia	0	1(12.5%)

AFI >24 had congenital malformations involving CNS and GIT maximally. AFI <5 had renal involvement maximally. One fetus in both polyhydramnios and oligohydramnios had more than one congenital malformation.

Table 3: Mode of Delivery in both groups

Mode Of Delivery	STUDY GROUP		CONTROL GROUP	
	Number n=100	%	Number n=100	%
Vaginal Delivery	63	63	85	85
OperativeVaginal Delivery	0	0	1	1
LSCS	37	37	14	14
	X^2=14.643			
	P Value=0.0001			

Labour was induced in 58% in study group and 40% in control group. The difference was found to be significant (p=.016). Study group had more number of cesarean sections than control group and the result was statistically significant.

Table 4: Indications of Caesarean Section

Indications	Study Group (AFI <5 & >24) n=37	Control Group (AFI 5-24) n=14
Fetal Distress	20(54.05%)	4(28.6%)
Others	17(45.94%)	10(71.4%)
X^2=1.723		
P Value=0.189		

Most common indication of cesarean section in study group was fetal distress.

Table 5 : Maternal Complications

Complications	Study Group (AFI <5 & >24) n=100	Control Group (AFI 5-24) n=100
Antepartum Hemorrhage	4	0
Gestational Hypertension	6	2
Prolonged IInd Stage	4	1
Atonic PPH	3	1
X^2=1.723		
P Value=0.189		

Complications like antepartum hemorrhage, gestational hypertension, prolonged 2nd stage and atonic PPH was more common in study group as compared to control group. But overall there was no significant difference in both the groups as far as maternal complications were concerned.

Table 6: Indications of Admission to NICU

Indications of Admission	STUDY GROUP (AFI <5 & >24) n=100	CONTROL GROUP (AFI 5-24) n=100
MAS	10	1
Birth Asphyxia	5	1
Prematurity	6	2
Jaundice	1	1
Respiratory Distress	11	5
X^2 =2.771		
P Value=0.597		

Study group had low 1 and 5 minute apgar scores compared to control group and the difference was found to be significant. For one minute apgar score p value was 0.0001 and for 5 minute apgar score p value was 0.002.There were more number of NICU admissions in study group and the difference was highly significant (p=0.0001). Study group had more cases with meconium aspiration syndrome, birth asphyxia, prematurity and respiratory distress. Meconium aspiration syndrome was significantly associated with more no. of NICU admissions in study group when compared to control group.

Table 7: Perinatal Outcome in Study Group(Oligohydramnios and Polyhydramnios)

Parinatal Outcome		Afi<5 N=79	Afi>24 N=21	x^2	P Value
Meconium Staining	Yes	24 (30.38%)	0	0.811	0.009
	No	35 (69.62%)	21(100%)		
Apgar Score 1 Min< 7 5 Min< 7		 25 (31.65%) 11 (13.92%)	 6 (28.57%) 5 (23.81%)	0.302	0.583
Non-Reassuring Fhr	Yes	10 (12.66%)	5 (23.81%)	0.862	0.353
	No	69(87.34%)	16 (76.19%)		
Admission To Nicu	Yes	26 (32.91%)	5 (23.81%)		0.592

	No	53 (67.09%)	16 (76.19%)	0.287	
Perinatal Death	Yes	7 (8.86%)	5 (23.81)		0.213
	No	62 (78.48%)	16 (76.19%)	1.553	

Meconium aspiration was more significantly associated with oligohydramnios. There was no significant difference in one and five minute apgar scores, admission to NICU and perinatal deaths in both the groups. Perinatal death in polyhydramnios was mostly due to congenital malformation.

IV. Discussion

Majority of patients were unbooked in our study group as compared to control group. Maximum no. of patients had age of 21-25 years' in both study and control groups. In our study, gestational hypertension was present in 6% cases as compared to 2% cases in control group. Maximum no. of patients had gestational age of 37-40 weeks in both Study and Control group with 58% in study group and 71% in control group. In our study, abnormalities in AFI were associated with congenital malformations in 12% of cases. Polyhydramnios had malformations in 33.33% of cases, most common being anencephaly in 50% of cases. Most common organ system involved was CNS (62.7%) followed by GIT (37.5%). In case of oligohydramnios most common organ system involved in congenital malformation was genitourinary (50%). Our study group had more number of labour inductions (58%) compared to 40% in control group. Our study group had caesarean section in 37% cases compared to 14% in control group. Most common indication of caesarean section in study group was fetal distress in 54.05% compared to 28.6% cases in control group. Mean birth weight in study group was 2.56 kg and control group was 2.70 kg. APGAR score was<7 in 31% cases at one minute and 16% of cases at five minutes in our study group compare to APGAR score of <7 in 9% of cases at 1 min and 2% of cases at 5 minute in control group. Our study group was associated with NICU admissions in 31% of cases as compared to 9% in control group. 10% of newborn in study group had meconium aspiration syndrome compared to 1% in the control group. Respiratory distress was present in 11% of cases and birth asphyxia in 5% in study group and 5% and 1% respectively in control group. Perinatal deaths were seen in 12% cases in study group and 1% cases in control group.

V. Conclusion

With routinely preformed ultrasound which is safe and non-invasive amount of liquor can be easily estimated. It is also useful to identify congenital malformations. Estimation of AFI can help us to plan our management and explaining fetal prognosis in cases of congenital malformations. Cesarean section was mostly performed for fetal heart rate abnormalities so importance of close watch on fetal heart rate can't be ignored. Babies were more prone to meconium aspiration, birth asphyxia, fetal distress and more number of admissions to NICU in oligohydramnios. Perinatal mortality and congenital malformations were high in case of polyhydramnios.Thus, we conclude that proper antenatal assessment, folic acid supplementation, measurement of AFI ultrasonographically, diagnosing oligohydramnios and polyhydramnios, proper counseling, careful monitoring of fetal heart rate, timely intervention and timely resuscitation by pediatrician can significantly decrease maternal morbidity and perinatal morbidity and mortality.

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