ORIGINAL ARTICLE

Relation between Borderline Amniotic Fluid Index and Perinatal Outcome

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Objective: Our purpose was to determine whether a borderline amniotic index during antenatal testing confers a significant risk of poor perinatal outcome.
Study Design: We conducted a retrospective review of all patients having antepartum testing at Gynae and Obstetrics department Fatima memorial hospital during six months period from January 2008 to June 2008.All women with singleton cephalic pregnancies who underwent antepartum testing within 1 week of delivery and who were delivered at Fatima Memorial Hospital were included in the study. An FI greater than 5cm and less than 10cm was defined as borderline and AFI of 10cm-24cm was considered normal.
Main outcome Measures: Perinatal death, intrapartum fetal distress, 5 min A/s<7, meconium staining of AF, IUGR and admission to neonatal ICU.
Results: There was no significant increase in the incidence of adverse perinatal outcome among the women with borderline AFI in comparison with control subjects with normal AFI volume. However an AFI<5cm was significantly associated with birth asphyxia, meconium aspiration, caesarean for fetal distress and low APRG score.
Conclusion: The present study suggests that borderline AFI is a weak predictive of perinatal outcome however an antepartum and intrapartum AFI of <5cm is associated with increased incidence of LSCS for fetal distress and a low APGAR score. A multicenter study with significant power should be undertaken to demonstrate that a low AFI is associated with an arterial PH<7.
Key Words: Amniotic fluid index, Border line amniotic fluid index, Antenatal surveillance, Neonatal outcome

INTRODUCTION

Alterations in amniotic fluid volume, especially decreased amniotic fluid volume (olighohydraminios) have classically been considered as an indicator of poor perinatal outcome [1-3]. The semiquantitative method of calculating an amniotic fluid index (AFI) by using ultrasound to measure the sum of the deepest pockets of amniotic fluid in the 4 quardants of the maternal abdomen is the most common method of quantifying amniotic fluid volume [1,3] . defining oligohydramnios as an AFI less than 5cm (standard definition[2,4]) or less than 8cm (alternate definition) and polyhydramnios as greater than 25 cm (standard definition [1,3]) or greater than 18 cm alternate definition) are 2 frequently used classifications. Studies of AFI for gestational age have shown an increase in mean AFI until the early third trimester, with a decrease in mean AFI thereafter[5].

Although the risks associated with a low AFI are well established, less information is available regarding the clinical significance of a low-normal or borderline AFI. Recent studies suggest that up to 16% of patients with a low AFI (5-8 cm) will develop oligohydramnios within 4 days[6, 7, 8].

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Recent studies, however, have challenged the relationship between amniotic fluid volume and poor prenatal outcome, especially the relationship between oligohydramnios and poor outcome near term[10,11,12,13,14].

Although little information is available on the perinatal risks associated with borderline AFI, these recent observations have lead to increased use of antepartum testing in women with a borderline AFI. Our objective was to determine the risk of adverse perinatal outcome associated with a borderline AFI, between 5 and 10 cm.
This study was undertaken because it was felt that there was an alarming trend of inducing patients who were otherwise normal but only had reduced amniotic fluid volume after 37 weeks of gestation.

MATERIALS AND METHODS

A retrospective review of all women entering antepartum testing from January 2008 to June 2008 was conducted. All patients underwent twice weekly testing with a modified BPP consisting of non stress tests and an AFI. All women with singleton pregnancies and who had antepartum testing within one week of delivery at our hospital were included.

Oligohydramnios was defined as an AFI of <=5cm. an AFI of 5.1 to 9.9 cm was considered borderline, and an AFI of 10 to 24 cm was considered normal. Four makers of adverse perinatal outcome were studied

1. Intrapartum fetal distress, identified by repetitive late deceleration , repetitive severe variable decelerations, prolonged decelerations, or fetal tachycardia with loss of variability
2. The observation of meconium-stained amniotic fluid
3. A 5-minute APGAR score<7
4. IUGR defined as birth weight at <10th percentile for gestational age[9.]

Correlations were made between AFI and perinatal outcome using appropriate statistical evaluation.

Significant neonatal complications were defined as the presence of CNS complications such as intraventricular hemorrhage, anoxic encephalopathy, retinopathy or seizures, the presence of early neonatal sepsis, necrotizing enterocolitis or other complications.

From January 2008 till June 2008 300 patients entered antepartum testing in our Gynae unit-III at FMH. 65 delivered greater than 1 week after the last test, 30 patients didn't returned for delivery in our hospital, 6 had twin gestation and so were excluded from the study. Out of remaining 199 patients 25 patients were found to have oligohydramnios and 6 had polyhydramnios. 70 patients had borderline AFI and were analyzed, 98 had normal AFI and were included in control group.

RESULTS

The groups were similar with respect to age, gravidity and parity. The groups were also similar with respect to indications for testing that is similar number of patients were followed for diabetes, hypertension and decreased fetal movements. But a significantly higher percentage of women in the borderline AFI group (40% Vs 24%) underwent antepartum testing because of post term pregnancy (41 weeks to 41+3 days) and also a high percentage of women in the borderline AFI group were enrolled in testing for suspected fetal growth restrictions (15% Vs 8%). To control for the potential confounding bias introduced by these difference the data was stratified by these two variables in all the subsequent analysis. No statistical significant difference was observed in patients with borderline AFI and in normal control group. On evaluating the perinatal outcome in terms of intrapartum fetal distress and meconium aspiration although there was more frequently found in with borderline AFI group.

Table-1: Perinatal Outcome Measures

	Borderline AFI (n= 70)	**Oligohydamnios< 5 cm (n=25)**	**Normal AFI n = 98**
Adverse Perinatal Outcome	2.86%	8.00%	2.04%
Intrapartum Fetal Distress	4.28%	16.00%	4.08%
Meconiom	4.28%	12.00%	7.14%
IUGR	7.14%	20.00%	-

Table-2: AFI Group + Congenital Anomalies

	YES	**NO**
< 5 cm (n=25)	8.00%	92.00%
5-10 cm (n=70)	1.43%	34.30%
10-25 (n=98)	1.02%	98.90%
>25 (n=6)	50.00%	50.00%

Demographic and Mode of Delivery (%age mean)

	Borderline AFI (n=70)	**Normal AFI (n=98)**
Age (Years/mean)	26050%	25.00%
Nullipara	30.00%	35.00%
Multipara	70.00%	65.00%
Induction of labour	17.14%	4.08%
Spontaneous labour	77.14%	4.08%
Assisted vaginal Delivery	82.86%	76.53%
Antepartum LSCS	2.86%	2.04%
Intrapartum LSCS	7.14%	7.14%
Mean Birth Weight	2.9 KG	3.2KG
1 min A/S <3	1	1
5 min A/S <3	1	1

There was an increased incidence of IUGR among women with borderline AFI, there was only one newborn with an APGAR score of less than 7 at 5 min.

Complications of labour (abruption, instrumental delivery, caesarean section for delivery) were also analyzed, no significant difference was found in the borderline AFI group and control group.

There was an increase risk of non reassuring FHR patterns in labour in the oligohydramnios group but no difference found between borderline AFI and normal AFI group.

There was also no difference in incidence of significant neonatal complications between the 2 groups and also no difference found in the length of stay in NICU.

DISCUSSION

Estimation of amniotic fluid volume is an integral part of antenatal fetal surveillance, and in some centers is a heavily weighted parameter[15].

The AFI has been validated as an accurate and reproducible technique for ultrasonographic assessment of amniotic fluid volume. However the significance of the index has not been thoroughly defined when the AFI was first described by Phelan et al[16] in 1987. Oligohydramnios was defined as an AFI less than 5cm. although this could be considered as relatively low cut off point because it is at the 2.5th percentile and less than 2SD below the mean for all gestation[17]. Conversely a borderline AFI defined as between 5 and 10 cm may represent up to the 30 percentile at term. Some patients included in this group surely represented the lower limit of amniotic fluid[18].

The pathophysiology explanation for this relationship supported by animal studies is that hypoxia initiates a reflex redistribution of fetal blood flow shunting blood towards the brain and away from the kidneys and thus decreasing both fetal urine production and amniotic fluid. Indirect measure of decreased uteroplacental perfusion (decreased villous profusion, increased placental resistance and abnormal uteroplacental Doppler waveforms has been associated with IUGR[19].

Before the description of AFI Chamberlain et al noted a significant proportional increase in growth restricted infants (defined as having a birth rate at less than 10 percentile for the gestational age) as amniotic fluid decreased. Women whose largest vertical pocket of amniotic fluid in antepartum testing was greater than 2cm had a 5% rate of IUGR, those with a less than 1 cm pocket of fluid had a 39% of IUGR[20,21].

A large study by Morris et al found that AFI has a poor sensitivity of adverse pregnancy outcome and was likely to lead to increased of static intervention without improving outcome[22.] To compound the controversy a number of studies have compared AFI to actual amniotic fluid volume determined by the dye dilutionary techniques and found that AFI was an unreliable technique for accurately estimating amniotic fluid[23,24].

Kreiser et al evaluated 150 low risk patients and found no increase in poor perinatal outcome in cases of isolated oligohydramnios group.

These figures were less than we had anticipated, this maybe due to the fact that our study included women who had attended for regular antenatal care furthermore there was no baby of less than 2400 gram in the cohort indicating that most women with growth restricted fetuses may have been identified earlier in the antenatal period. This confirms that the detection of growth restricted fetuses is an important aspect of antenatal period.

Although the AFI is a superior test to a single deepest pool at identifying pregnancies at risk. Two issues remain; first there is as yet no proven intervention that reduces this morbidity. Randomized controlled trails are necessary to assess the clinical effectiveness of delivery based on the ultrasound assessment of AFI. Our data do not suggest that oligohydramnios is a contra indication to labour and vaginal birth. Second test of fetal welfare are necessary to assess the risk. Pathophysiological mechanism other than failing placental function maybe responsible including intraprtum infection with group-B streptococcus and cord entanglement. We concluded that oligohydramnios as assessed by AFI is associated with neonatal morbidity. Clinical trails are necessary to assess the effectiveness of clinical management, once oligohydramnios is detected.

In summary we observed higher incidence of IUGR in women with low AFI than in rates of fetal distress and meconium passage.

The incidence of AFI less than 5cm whether obtained in the antepartum or intrapartum period. Varied widely 3 to 40%. Number of factors could have accounted for this finding. One different population with varying prevalence of complication, 2nd inter-observation variability and technique of insonation. Third diverse obstetrics factors that influenced the actual volume of amniotic fluid. For example among pregnant women with diabetes the incident of oligohydramnios is 3% but among patients with several preeclampsia, it is 20% in community hospital and AFI less than 5 was reported in 12% of cases whereas at tertiary hospital the incident was 38%. Gestational age influences the normal distribution of AFI resulting in significant difference of preterm, term and post-term pregnancies. Undeniably there's inter-observer variability when the deepest vertical pockets are measured in four quadrants particularly at the lower end of amniotic fluid. When repeated measure amniotic fluid was ysed the transducer pressure, the ambient temperature, altitude, diabetic glucose control and the status of meternal hydration and amniotic membranes may influence AFI. Considering the potential number of confiding variable it not surprising that the reported AFI varies widely.

A multicenter study with significant power should be undertaken to demonstrate that a low AFI is associated with an arterial PH<7

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