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Original Research Article

The predictive value of amniotic fluid index for adverse perinatal outcome and suggested plan of action

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ABSTRACT

Background: Modern obstetrics and perinatal medicine is concerned with recognition of a fetus at risk for death or damage in utero: quantifying the risk and determining the optimal time and mode of intervention. Objective of present study was to determine whether an antepartum amniotic fluid index (AFI) of 5.0cm or less is a predictor of adverse perinatal outcome.
Methods: This was a prospective study of 400 antenatal women booked at Muzaffarnagar Medical College during the year 2015-16 with gestational age between 36 and 41 weeks AFI was determined using the Phelan's technique within 7 days of delivery or at the onset of labour. Perinatal outcome was compared between two groups i.e. AFI ≤5 and >5.
Results: An AFI of 5.0cm or less was significantly associated with higher cesarean section rate for fetal distress and low birth weight babies. There was no significant difference in APGAR score at 5 min. <7 between the two groups.
Conclusions: Determination of AFI is valuable for predicting fetal distress in labour requiring cesarean section. It can be used as an adjacent to other fetal surveillance methods. An AFI <5 detected after 36 weeks of gestation is an indicator of poor perinatal outcome.

Keywords: Amniotic fluid index, APGAR score, Cesarean delivery, Non-stress test

INTRODUCTION

Modern obstetrics and perinatal medicine is concerned with recognition of a fetus at risk for death or damage in utero: quantifying the risk and determining the optimal time and mode of intervention. Clinical estimation of amniotic fluid volume (AFV) is an important part of fetal assessment as variation in its amount has been related to a variety of pregnancy complications.

Amniotic fluid provides the fetus with a protective low resistance environment suitable for growth and development.In some cases the amniotic fluid may measure two low or too high.[1] In 1987 Phelan et al described a four quadrant method of assessing AFI.[2] Using that technique an AFI of 5 cm or less is defined as oligohydrominos. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing especially in the third trimester.

Links have been found between decreased amniotic fluid volume and the non-reactive non-stress tests, FHR declarations, cesarean sections for fetal distress and low APGAR scores.[3,4]

Keeping in mind the present study was carried out to fluid whether oligohydraminios can be used as a predictor of adverse perinatal outcome in non-complicated pregnancies at term.

METHODS

The present study was a prospective study carried out at Muzaffarnagar Medical College, Muzaffarnagar. The study participants included 400 booked antenatal women registered at Muzaffarnagar Medical College & Hospital, Muzaffarnagar between 36 and 41 weeks admitted for delivery over a 2 year duration from 2014 to 2016.

Inclusion criteria

- Single non-anomalus fetus
- Intact membranes.

Exclusion criteria

- Ruptured membranes
- Fetal anamoly
- Gestational diabetes
- Rh incompatibility
- Multiple pregnancies

On admission, a detailed history was taken and a clinical examination was performed. Amniotic fluid index was determined using the Phelan's technique within 7 days of delivery or at the onset of labour. Non-stress test (NST) was performed for all patients. Women were divided into two groups based on their AFI: Group - 1: AFI ≤5; Group 2 - AFI >5. A note was made of mode of delivery, birth weight APGAR score at 1 and 5 minutes. The results were recorded and tabulated. They were statistically analyzed using Chi-Square test.

RESULTS

Out of the 400 women the mean maternal age was 27.67 in group 1 and 26.07 in group 2, out of which 46 (67.6%) were nulliparous in group 1 and 199 (59.9%) in group 2.

Table 1: Maternal demographic obstetric characteristics.

	AFI <5 (n=60)	AFI >5 (n=332)	P value
Maternal Age (mean)	27.67	26.07	
Nullilparity	46 (67.6%)	199 (59.9%)	0.2353
Gestational age <38 weeks at delivery)	38 (55.9%)	114 (34.3%)	0.0009
Weight gain <10 Kg	25 (36.8%)	28 (8.4%)	<0.0001
Induction of labour	49 (72.1%)	169 (50.9%)	0.0015

Gestational age was < 38 weeks in 38 (55.9%) in group 1 as compound to 114 (34.3%) in group 2. Maternal weight gain during pregnancy was <10 kg in 25(36.8%) in group 1 as compared to 28(8.4%) in group 2.49 patients (72.1%) were induced in group 1 as compared to 169 (50.9%) in group 2. Obstetrics and perinatal outcome were studied in both the groups.

Table 2: Association of NST with oligohydraminos.

NST	Oligo AFI <5	Normal AFI >5	P Value
Reactive	30 (44.1%)	300 (90.4%)	0.0005
Non-reactive	38 (55.9%)	32 (9.6%)	0.0001
	68	332	

Table 2 shows that non-reactive NST was present in a significant number of patients in group 1 (55.9%) as compared to group 2 (9.6%) (P<0.001).

Table 3: Mode of delivery according to AFI.

Mode of delivery	AFI <5	AFI >5	P value
Total cesarean delivery	30 (44.1%)	105 (31.9%)	0.0479
Cesarean for non-reassuring fetal stress	17 (56.6%)	40 (38.1%)	0.0056
Normal delivery	38 (55.9%)	226 (68.1%)	0.0481

Cesarean section was performed in 38(55.9%) women in group 1 as compared to 106 (31.92%) in group 2. A chi square statistic test was carried out to determine the significance of correlation between the AFI and mode of delivery. A p value was obtained which was less than 0.05. This indicated the presence of a very strong and significant correlation between the AFI and mode of delivery.

Table 4: Perinatal outcomes.

	AFI<5 (n=68)	AFI>5 (n=332)	P value
Birth weight (<2.5kg)	38 (55.9%)	72 (21.7%)	<0.0001
APGAR Score 1 min <7	24 (35.3%)	36 (10.8%)	<0.0001
5 min <7	3 (4.4%)	11 (3.3%)	0.6536

Birth weight <2.5 kg was found in 38 (55.9%) patients in group 1 as compared to 72 (21.7%) in group 2. In Group 1 the APGAR score at 1 min was <7 in 24 women (35.3%)j as compared to 36 (10.8%) in group 2 (P = <0.0001). An APGAR score <7 at 5 min was noted in 3 (4.4%) women in group 1 and 11 (3.3%) women in group 2 (P=0.6536).

DISCUSSION

The non-reactive NST rates are high in women with AFI < 5 cm. The rate of non-reactive NST is 55.9%. This is in accordance with the study by Chandra et al, Sriya et al

and Kumar et al with 69.23%, 41.55% and 40% respectively.[5-7] These studies show that more than half of the patients with AFI<5 have non-reactive NST.

Various studies show different rates of LSCS for fetal distress in pregnant woman with AFI <5 cm. The LSCS for fetal distress was 76.92%, 51% and 43.05% in studies done by Chandra et al, Casey et al and Sriya et al respectively.[5,6,8] It was 56.6% in present study Rutherford et al found an inverse relationship between amniotic fluid index and cesarean section for fetal distress.[9]

In the current study birth weight <2.5kg was found in 38(55.9%) group 1versus 72 (21.7%) in group 2, the difference being statistically significant (p<0.0001). Morreset al found that 60% of babies were of LBW in the group with AFI<5, indicating that oligohydraminos had an association with growth restriction.[10] A study by Rutherford et al showed that when the AFI was <5, 36% pregnancies resulted in infants with intra uterine growth restriction (IUGR).[9]

In the present study, the 1 min APGAR Score was <7 in 24 (35.3%) babies in group 1 whereas only 72 (10.8%) babies in group 2 had 1 min APGAR Score <7 and this difference was statistically significant (P <0.0001).

However, the 5 min APGAR Score <7 was almost equal in both the groups (4.4 vs 3.3%) (p=0.6536).

A study by Grubb et al[11] 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. In the same study the 5 min APGAR score <7 was seen in 13% patients with AFI <5 versus 5% in the normal AFI group.

CONCLUSION

An AFI of <5 cm detected after 36 completed weeks of gestation in a low risk pregnancy is an indicator of poor perinatal outcome. In presence of oligohydroamnios, the occurrence of non-reactive NST, abnormal FHR tracings during labour, development of fetal distress, the rate of LSCS, low 1 min APGAR score and perinatal mortality are high. Determination of AFI should be used as an adjunct to other fetal surveillance method. Continuous antepartum and intrapartum monitoring are mandatory for every woman diagnosed with oligohydroamnios to reduce the maternal and neonatal risks.

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