

Correlation of Amniotic Fluid Index with Perinatal Outcome

Shruti Prabha^{1*}, Kumudini Jha²

^{1*}Junior Resident, ²Associate Professor,

Department of Obstetrics & Gynaecology, Darbhanga Medical College & Hospital, Darbhanga, Bihar, India.

ABSTRACT

Objectives: We aimed to evaluate the predictive value of amniotic fluid index (AFI) (<%) for adverse perinatal outcome in terms of cesarean section for fetal distress, birth, weight, meconium staining, Apgar scores, and cord pH at birth.

Methods: This was a prospective study 200 antenatal women book at Darbhanga Medical College & Hospital during the year January 2012 to January 2013 with gestational age between 34 and 41 weeks. The women's history, clinical examination recorded, and AFI were measured and the perinatal outcome was compared between two groups i.e. AFI < 5 and > 5.

Results: The cesarean section rate for fetal distress and low birth weight babies, <2.5 Kg., was higher in patients with oligohydramnios ($p = 0.048, 0.001$ respectively). There was no significant difference in meconium staining, Apgar score at 5 minute < 7, and cord pH at birth between the two groups ($p = 0.881, 0.884, 0.764$ respectively).

Conclusions: Oligohydramnios has a significant correlation with cesarean section for fetal distress and low birth weight babies.

Keywords: Meconium Staining, Cesarean Delivery, Apgar Scores, Birth Weight, Cord pH.


*Correspondence to:

Dr. Shruti Prabha,
Shristi Hospital & Research Centre, Kanke, Ranchi.

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INTRODUCTION

Modern obstetrics is concerned with the health and the well being of both the mother and the unborn child. Recognition of a fetus at risk for death or damage in utero, quantifying the risk, balancing the fetal risk against the risk of neonatal complications from immaturity, and determining the optimal time and mode of intervention are the cornerstones of the modern perinatal medicine.¹

Clinical estimation of Amniotic Fluid Volume (AFV) is an important part of fetal assessment as variation unit amounts has been related to a variety of pregnancy complications. Amniotic Fluid provides a protective milieu for the growing fetus, cushioning it against mechanical and biological injury.^{2,3}

Quantification of Amniotic Fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing, especially in the third trimester.⁴ Antenatal tests use Amniotic Fluid Volume as a fundamental assessment of chronic in utero stress. Ultrasound being a non-invasive test is idea for application on a large scale and can be used frequently for repeat AFV determination in the case of suspected abnormalities.³

Links have been found between decreased Amniotic Fluid Volume and still births, fetal anomaly, abnormal, FHR tracings in labor, increase in cesarean section for fetal distress, and possibly fetal acidosis.²

In the present study Amniotic Fluid Quantification was done by the four quadrant technique as described by Phelan et al⁵ to determine AFI and we sought to determine if antepartum AFI of 5 cm or less is predictor of adverse perinatal outcome in terms of meconium staining, cesarean section for fetal distress, birth weight, low Apgar scores, and cord pH.³

MATERIALS AND METHODS

The present study was a prospective study carried out at the Darbhanga Medical College & Hospital, Darbhanga. The study participants included 200 booked antenatal women registered at DMCH with gestational age between 34 and 41 weeks admitted for delivery over 1-year duration from January 2012 to January 2013. Inclusion criteria were women with a singleton, nonanomalous fetus with intact membranes at the time of antepartum testing. Women with premature rupture of membranes, with known fetal or chromosomal anomalies, gestational diabetes, Rh incompatibilities, placental anomalies, and multiple pregnancies were excluded from the study. On admission a detailed history was taken, and a clinical exam was performed and gestational age assessed. Amniotic Fluid Index was determined using the Phelan's technique⁵ within 7 days of delivery or at the onset of labor after informed written consent.

Nonstress test was performed for all patients. Women were divided into two groups based on their AFI (done within 7 days of delivery): Group 1– AFI ≤ 5; Group 2 – AFI > 5. A note was made of meconium staining of amniotic fluid, the ultimate mode of delivery, birth weight, apgar score at 1 and 5 minutes, and cord pH measured at the time of birth. Chi square (x²) test was carried out at 5% (α = 0.05) level of significance to test the homogeneity of the groups with respect to the distribution of patients over different classes of a characteristics of interest (Tables 1,2,3).

RESULTS

Out of the two hundred women, the mean maternal age was 27.04 in the group 1 and 27.95 in group 2, out of which 17 (68%) women were nulliparous in group 1 and 103 (58.9%) in group 2. Gestational age was < 37 weeks in 14 (56%) in group 1 as compared to 60 (34.3%) in group 2. Maternal weight gain during pregnancy was < 10 Kgs in 9 (36%) in group 1 as compared to 15 (8.6%) in group 2. 18 (72%) patients were induced in group 1 as compared to 89 (50.9%) in group 2. Obstetric and perinatal outcomes were studied in both the groups. 4 (16%) women in group 1 and 26 (14.9%) women in group 2 had meconium stained liquor. The difference was not statistically significant (p = 0.881). Cesarean section was performed in 14 (56%) women in group 1 as compared to 62 (35.4%) in group 2 (p = 0.047). Cesarean

section for fetal distress was higher in women with oligohydramnios (57.1%) as compared to women with AFI > 5(38.7%) (p = 0.048). Birth weight < 2.5 Kg was found in 14 (56%) in group 1 as compared to 38 (21.7%) in group 2. In group 1, the Apgar score in one minute was < 7 in 9 women (36%) as compared to 19 (10.9%) in group 2 (p = 0.001). An Apgar score was < 7 was noted in 1 (4%) women in group 1 and 6 (3.4%) women in group 2 (p = 0.884) cord pH was < 7.1 found in 1 (4%) women in group 1 as compared to 5 (2.9%) in group 2 and the difference was not statically significant (p = 0.764).

In group 1, out of 25 women, 17 (68%) had normal cardiotocography and 5 (20%) had pathological cardiotocography. In group 2 patients, out of 175 patients, 146 (83.4%) had a normal CTG and 9 (5.1%) had a pathological CTG. The rate of pathological CTG in group 1 was statically significant (Fig. 1).

Non-reactive NST was present in a significant number of patients in group 1 (32%) as compared to group 2 (9.7%) (p = 0.002). Most of the babies in group 1, i.e. 23 (92%) were admitted to NICU. However, in group 2 -125 (71.4%) babies were admitted to the NICU.

Thus, in group 1 there was a significant correlation to NICU admission. Duration of NICU stay of > 2 days was found in 9(36%) in group 1 and 42 (24%) in group 2 (p = 0.198). Therefore, the two groups were comparable with regard to the NICU stay.

Table 1: Maternal demographic and characteristics

	AFI ≤ 5 (n =25)	AFI > 5 (n =175)	p value
Maternal age (mean)	27.04	27.95	0.34
Nulliparity	17 (68 %)	103 (58.9 %)	0.22
Gestational age < 37 weeks at delivery	14 (56 %)	60 (34.3 %)	0.035
Weight gain ≤ 10 Kg	9 (36 %)	15 (8.6 %)	0.001
Induction of labor	18 (72 %)	89 (50.9 %)	0.043

Table 2: Obstetric and perinatal outcome

	AFI ≤ 5 (n =25)	AFI > 5 (n =175)	p value
Meconium-stained liquor	6 (16 %)	26 (14.9 %)	0.881
Total Cesarean delivery	14 (56 %)	62 (35.4 %)	0.047
Cesarean for non-reassuring fetal status	8 (57.1 %)	24 (38.7 %)	0.048
Birth weight < 2.5 kg	14 (56 %)	38 (21.7 %)	0.001
Apgar Score			
1 min < 7	9 (36 %)	19 (10.9 %)	0.001
5 min < 7	1 (4 %)	6 (3.4%)	0.884
Cord Ph < 7.1	1 (4 %)	5 (2.9 %)	0.764

Table 3: Secondary outcome measures

	AFI ≤ 5 (n =25)	AFI > 5 (n =175)	p value
Non-Reactive NST	8 (32 %)	17 (9.7 %)	0.002
Admission to NICU	23 (92 %)	125 (71.4 %)	0.028
NICU stay > 2 days	9 (36 %)	42 (24 %)	0.198

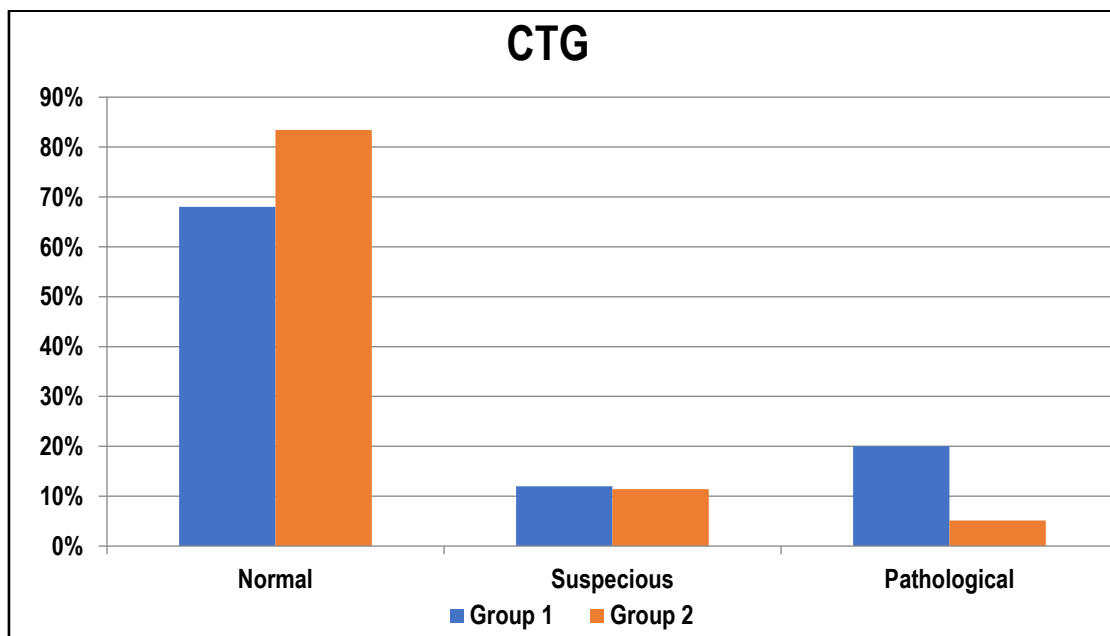


Fig 1: Intrapartum CTG

DISCUSSION

In the present study, meconium stained liquor was present in 4 (16%) of the patients in group 1 and 26 (14.9%) in group 2, and the difference was not significant ($p = 0.881$). The cesarean section rate was higher in group 1 with $AFI \leq 5$, i.e., 56% as compared to 35.4% for group 2, and the difference was statistically significant ($p = 0.047$). Caesarean section for fetal distress was also higher in patients with oligohydramnios as compared to the group with normal AFI (57.4 vs 38.7%) ($p = 0.048$). A study conducted by Barron et al⁶ showed that meconium stained amniotic fluid occurred significantly less often in the oligohydramnios group as compared to the normal AFI group. Study by Voxman et al⁷ concluded that there was no difference between the groups with regard to meconium stained liquor which was comparable to our study. Chauhan et al⁸ in their meta-analysis (1999) found that intrapartum $AFI \leq 5$ was associated with increased risk of cesarean section for fetal distress (pooled $RR = 1.7$), which was similar to our study. Rutherford et al⁹ found an inverse relationship between amniotic fluid index and cesarean section for fetal distress.

In the current study, birth weight < 2.5 Kg was found in 14 (56%) of the patients in group 1 vs 38 (21.7%) in group 2, and difference was statistically significant ($p = 0.001$). Locatelli et al¹⁰ reported that an uncomplicated term pregnancy with oligohydramnios, the presence of $AFI < 5$ independently increase the risk for an SGA infant. Morris et al¹¹ found that 60% of babies were of LBW in the group with $AFI < 5$, indicating that oligohydramnios had an association with the growth restriction (IUGR).

In the present study, the one-minute Apgar score was < 7 in 9 out of 25 (36%) babies in group 1, whereas only 10.9% babies in group 2 had a 1-minute Apgar score < 7 , and this difference was statistically significant ($p = 0.001$). However, the 5-minute Apgar score < 7 was almost equal in both the groups (4 vs 3.4 %) ($p = 0.884$). Chauhan et al⁸ reported in their meta-analysis that antepartum $AFI \leq 5$ was associated with a 5 minute Apgar score of < 7 (pooled $RR = 1.8$, 95% CI 1.1-2.6). A study by Driggers et al¹² reported a 5 minute Apgar score < 7 in 3.8%

patients in an oligohydramnios group vs 4.6% in a normal AFI group and concluded that there was no significant difference. A study by Grub et al¹³ found the 1-minute Apgar score < 7 in 84% patients with $AFI \leq 5$ as compared to 14% in the normal AFI group, which was highly significant ($p = 0.01$). In the same study the 5-minute score of < 7 was seen in 13% patients with $AFI \leq 5$ vs 5% in the normal AFI group.

In the present study, the cord pH at the time of birth which is an objective marker of fetal distress was < 7.1 in one baby (4%) in group 1, whereas 5 babies out of the 175 (2.9%) in group 2 had cord pH of < 7.1 which was not statistically significant. A study by Chauhan et al⁸ also found no clear correlation between AFI and neonatal acidosis and it was stated that a multicentric study of sufficient power should be undertaken to demonstrate that low AFI is associated with umbilical artery pH of < 7 . A study by Morris et al¹¹ found a significant association between the number of babies with cord pH of < 7 and $AFI \leq 5$ as 5.1% vs 1.3% for $AFI > 5$ ($RR = 3.3$ and p value of 0.01).

CONCLUSIONS

In the present study, antepartum oligohydramnios ($AFI \leq 5$) was associated with increased cesarean delivery, particularly for fetal distress. A significant correlation was found between oligohydramnios and low birth weight babies. However, there was no difference in perinatal outcome in terms of meconium staining, 5-minute Apgar score, and cord pH between the groups. When the secondary outcome was measured significant correlation was found in the terms of non-reactive NST and admission to the NICU.

Therefore, patients with severe oligohydramnios with $AFI \leq 5$ should undergo antepartum management in the form of induction of labor in order to improve their perinatal outcome.

REFERENCES

- Manning FA. Antepartum fetal testing: a critical appraisal. *Curr Opin Obstet Gynecol.* 2009;21(4):348-52.

2. Chamberlain PF, Manning FA, Morrison I, et al. The relationship of marginal and decreased amniotic fluid volumes to perinatal outcome. *Am J Obstet Gynecol.* 1984;150(93):245-9.
3. Nagoeete MP, Towers CV, Asrat T, et al. Perinatal outcome with the modified biophysical profile. *Am J Obstet Gynecol* 1994;170(6): 1672-6.
4. Kofinas A, Kofinas G. Differences in amniotic fluid patterns and fetal biometric parameters in third trimester pregnancies with and without diabetes. *J Matern Fetal Neonatal Med.*2006;19910;633-8.
5. Phelan JP, Ahn MO, Smith CV, et al. Amniotic fluid index measurements during pregnancy, *J Reprod Med.* 1987;32:601-4.
6. Baron C, Morgan MA, Garite TJ. The impact of amniotic fluid volume assessed intrapartum on perinatal outcome. *Am J Obstet Gynecol.* 1995;173(1):167-74.
7. Voxman EG, Tran S, Wing DA. Low amniotic fluid index as a predictor of adverse perinatal outcome. *J Perinatol.* 2002;22(4):282-5.
8. Chauhan SP, Sanderson M, Hendrix NW, et al. Perinatal outcome and amniotic fluid index in the antepartum and intrapartum periods: a meta-analysis. *Am J obstet Gynecol.* 1999;181(96):1473-8.
9. Rutherford SE, Phelan JP, Smith CV et al. The four quadrant assessment of amniotic fluid volume: an adjunct to antepartum fetal heart rate testing. *Bstet Gynecol.* 1987;70(3):353-6.
10. Locatelli A, Vergani P, Toso L, et al Perinatal outcome associated with oligohydramnios in uncomplicated term pregnancies. *Arch Gynecol Obstet.* 2004;269(2):130-3.
11. Morris JM, Thompson K, Smithey J, et al. The usefulness of ultrasound assessment of amniotic fluid in prediction adverse outcome in prolonged pregnancy: a prospective blinded observational study. *Br J Obstet Gynecol.* 2003;110(11):989-94.
12. Driggers, RW, Holcroft CJ, Blakemore KJ, et al. An amniotic fluid index ≤ 5 cm within 7 days of delivery in the third trimester is not associated with decreasing umbilical arterial pH and base excess. *J Perinatol.* 2004;24(2):72-6.
13. Grubb DK, Paul RH. Amniotic fluid index and prolonged antepartum fetal heart rate decelerations. *Obstet Gynecol.* 1992;79(4):558-60.

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