Research Article

Study of Amniotic Fluid Index Measurements in High Risk Pregnancies and Outcome

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Abstract: Amniotic fluid serves several functions during pregnancy and labour. It creates space for fetal movements. It is probably of mixed maternal and fetal origin. The study of amniotic fluid provides useful information about the wellbeing and also maturity of the fetus. Variation in the amniotic fluid volume may reflect fetal compromise, congenital anomalies, and may predict perinatal morbidity and mortality. The objective of present study is to study the patterns of change in the amniotic fluid index from 32 weeks till delivery in 100 cases of high risk pregnancy and to study the perinatal outcome in relation to AFI (amniotic fluid index) in high risk pregnancies. It is a prospective study of 100 pregnant women attending the antenatal op clinic or as emergency in the department of OBG, Government General Hospital, Vijayawada from Oct 2011 to Oct 2012 for their high risk factors, randomly recruited into the study. Ultrasound was performed for all the cases and the results of amniotic fluid index were analyzed. AFI has high specificity, positive predictive value, and negative predictive value. AFI assessment by Ultrasound is one of the important tools in assessing the fetal health in all high risk pregnancies.
Keywords: Amniotic fluid volume, Amniotic fluid index, Polyhydramnios, Oligohydramnios, Fetal compromise, Meconium stained liquor.

INTRODUCTION

The importance of amniotic fluid volume as an indicator of the fetal status was appreciated only recently. Ultrasound assessment of the amniotic fluid is used frequently to identify the fetuses at risk of having adverse fetal outcomes – as suggested by the finding of abnormal fluid volumes[1-3].

At full term, the major source of amniotic fluid production is from the fetal urine (400-1200 ml) and it is mainly removed by fetal swallowing (500-100 ml) everyday. Maximum amount of amniotic fluid is found at gestational age (36 wks) of about 1000 ml and thereafter, the amount diminishes with reduction to the extent of about 200 ml by 42 weeks.

Amniotic fluid volume evaluation is a component of every standard sonogram performed in the second and third trimesters[4].

Methods of estimating the amniotic fluid volume:
1. Maximum vertical pocket (MVP): This technique involves selecting the single deepest uninterrupted vertical pocket of amniotic fluid, and measuring its depth. The normal range for single pocket that is commonly used is 2-8 cm, with values above and below indicating polyhydramnios and oligohydramnios respectively.
2. Amniotic fluid index: Described by Phelan and co-workers (1987)[5]. Adding the vertical depths of largest pocket in each of the 4 equal uterine quadrants. The normal range of AFI that is most commonly used is 5-24 cm with values above and below this indicating polyhydramnios and oligohydramnios respectively.

Oligohydramnios :
Amniotic fluid volume is reduced to 5th percentile (300 ml) or AFI < 5 cm.
Causes: Post term pregnancy, premature rupture of membranes, fetal renal anomalies, intrauterine growth retardation, drugs like ACE inhibitors.

Polyhydramnios:
Amniotic fluid volume above 95th percentile (1500-2000 ml) or AFI > 24 cm
Causes: Idiopathic, fetal anomalies, diabetes mellitus including GDM (gestational diabetes mellitus), multiple pregnancies, hydrops fetalis, chorioangioma of placenta.

Value of amniotic fluid assessment in evaluation of pregnancy:
1. Prediction of poor perinatal outcome, perinatal morbidity and mortality – with oligohydramnios, meconium passage, fetal heart rate abnormalities, and depressed APGAR scores are common.
2. Prediction of IUGR and placental insufficiency. Oligohydramnios may be a sign of poor placental function. It may be associated with intrapartum asphyxia and fetal death.

MATERIALS AND METHODS
The present study was conducted in the department of OBG, Government General Hospital, Vijayawada, from October 2011 to October 2012. 100 pregnant women with high risk factors, attending the antenatal OP clinic, or as emergency referred from outside, were admitted into the inpatient wards and included in the study.

Inclusion criteria:
- Single ton pregnancy with gestational age > 32 weeks,
- Hypertensive disorders
- Diabetes complicating pregnancy including Gestational diabetes
- Intrauterine growth retardation
- Past dates
- Liquor abnormalities
- Bad obstetric history

Exclusion criteria:
- Pregnant women with gestational age < 32 weeks or in labour

- Antepartum hemorrhage
- Eclampsia 4) Multiple gestation
- Ruptured membranes
- Congenital anomalies
- Intrauterine fetal death

A detailed history of the pregnant women was taken, and thorough clinical and obstetric examination was performed. All preliminary investigations were done. Real time ultrasound scanning was performed using a 3.5 Mhz sector probe (LOGIC alpha 200). General survey of the fetus was done and presentation noted. The volume of AFI was measured according to the 4 quadrant technique described by Phelan et al[5]. Patient is placed in supine position with a slight left tilt if necessary. Uterus is divided into 4 quadrants using the maternal sagittal midline vertically and an arbitrary transverse line perpendicular to maternal coronal plane. The vertical depth of unobstructed and clear pocket of amniotic fluid is used for measurement. This process repeated in each of the 4 quadrants and values were added together. The test was repeated on weekly basis depending upon high risk factors. The last observation was compared with outcome of pregnancy. Intra-observer variability of AFI is approximately 1 cm and inter-observer variability is about 2 cm.

End points to assess the outcome of pregnancy:
- Thick meconium stained liquor
- 5 min APGAR score < 7
- Admission to NICU

OBSERVATIONS AND RESULTS
The study group consisted of 100 high risk patients. The results are as follows.

1) **Distribution of risk factors:**

Cases	Pre-eclampsia	Post dates	IUGR	GDM	Rh -ve	BOH
100	43	39	11	7	5	2

PIH (43%) and post dated pregnancy (39%) are the commonest risk factors.

2) **Gravida distribution:**

Cases	Primi gravida	2nd gravida	3rd gravida	4th gravid
100	55	29	12	4

Majority of patients (55%) are primi gravidae.

3) **Age distribution:**

Cases	18-20 yrs	21-25 yrs	26-30 yrs	31-35 yrs
100	23	50	23	4

Most of the patients belong to the 21-25 yr age group.

4) **Gestational age-wise AFI results:**

Gestational age (wks)	No. of patients	AFI normal	AFI abnormal
32-34 wks	2	2	0
34-36 wks	5	3	2
36-38 wks	24	23	1
38-40 wks	30	30	0
>40 wks	39	36	3

Majority of the patients are >40 wks gestational age.

5) **Mode of delivery:**

Cases	Vaginal	LSCS
100	54	46

Most of the patients had vaginal delivery (54%)

6) **Indications for LSCS:**

Failed induction	12	12%
Failure of progress of labor	5	5%
Fetal distress	11	11%
Severe PIH with abnormal Doppler	5	5%
CPD	6	6%
Abnormal Doppler	4	4%
BOH	2	2%
Breech	1	1%

In majority of cases, the indication was failed induction and fetal distress.

7) **AFI vs mode of delivery:**

AFI result	No. of patients	Vaginal	LSCS
< 5 cm	6	0	6
5-9 cm	84	46	38
> 9 cm	10	8	2

In the present study, 6 cases had AFI < 5 cm. Incidence of LSCS increased to 100% when AFI < 5 cm (Severe oligamnios). Among 84 cases with AFI 5-9 cm, LSCS was performed in 38 cases (45.2%). Among 10 cases with AFI > 10 cm, LSCS was performed in only 2 cases (20%) for failed induction.

8) **AFI vs perinatal outcome:**

AFI	No. of patients	Clear liquor	Meconium stained liquor	NICU admission-yes	NICU admission- no
<5	6	0	6	5	1
>5	94	81	13	8	86

The last AFI results were correlated with fetal outcome. All 6 cases with AFI < 5 had meconium stained liquor. Among 94 cases with AFI > 5, only 13 patients had meconium stained liquor and 81 patients had clear liquor.

9) **AFI vs APGAR score:**

AFi	No. of patients	APGAR < 7	APGAR > 7
<5 cm	6	6	0
5-9 cm	84	11	73
>9 cm	10	0	10

All 6 cases with AFI < 5 cm had birth asphyxia with APGAR < 7. Among 84 cases with AFI 5-9 cm, only 11 cases had APGAR < 7. When AFI was > 9 cm, there were no cases of birth asphyxia and all babies had APGAR > 7.

CAUSES OF NICU ADMISSION:
Among 13 babies, MSL-8, Hypoglycemia-2, Tachypnoea-1, Resuscitation-2. Among 6 cases with AFI < 5, 5 required NICU admission for MSL.

DISCUSSION
In the present study, the test group consists of 100 high risk patients with 32 or more weeks of gestational age. The major risk factors are PIH, past dates, IUGR, GDM, and Rh –ve pregnancies. Majority of patients with pre-eclampsia are primi gravidae. Majority of patients with GDM had excessive liquor. Most of patients are in age group 21-25 years. In the present study, AFI testing was initiated from 38 weeks onwards in 69 cases because of the late referral of patients or patients attending the antenatal clinic only after the development of complications. More than 40 wks gestational age (39%) and 38-40 wks (30%) on admission. Last AFI result reveals 6 cass with AFI <5, 84 cases with AFI 5-9 and 10 cases with AFI >9.

54% of patients had vaginal delivery and 46% had LSCS. Incidence of LSCS has increased to 100% when AFI < 5 cm and 49.5% with AFI 5-9 cm. Out of 100 patients, thick MSL was observed in 19 cases. APGAR <7 in 17% of patients who had 2 or more risk factors like PIH with IUGR or post dates with IUGR.

Efficacy of AFI obtained in the present study

Test	AFI-APGAR score	AFI-MSL	AFI-NICU admission
Sensitivity	35.29%	25.00%	41.67%
Specificity	100%	100%	98.86%
+ve predictive value	100%	100%	83.33%
-ve predictive value	88.30%	63.27%	92.55%

Results in present study are compared with Maryam et al. [1].

	Maryam et al (2013)	Present study
APGAR < 7	20.2%	16%
NICU admission	14%	13%

CONCLUSION
Severe oligohydramnios (AFI < 5 cm) in the presence of IUGR or prolonged gestation is associated with significant increase in perinatal morbidity and mortality. Isolated oligohydramnios with an otherwise normal fetus is not associated with increase in perinatal morbidity and mortality.

The presence of oligohydramnios by itself is not an indication for delivery. This finding requires prompt evaluation with other antepartum fetal surveillance techniques like non stress test and Doppler to rule out any fetal compromise.

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