ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

AMNIOTIC FLUID INDEX IN HIGH RISK PREGNANCIES AND FOETAL OUTCOME

KEY WORDS: Amniotic fluid index(AFI) ,Oligohydramnios.

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ABSTRACT

Abstract:Background: Amniotic fluid index is one of the major and deciding components of foetal Biophysical profile and by itself it can predict pregnancy outcome.
Objective: To study the effect of AFI on perinatal outcome in high risk pregnancies
Methodology:AFI was measured in one hundred consecutive patients diagnosed with pregnancy induced hypertension and well documented duration of pregnancy.Patients were followed up until delivery and foetal outcome was noted .
Results: The incidence of induction of labour in oligohydramnios was 72.6%. The perinatal morbidity and mortality were higher in Oligohydramnios group.
Conclusion: The four quadrant technique of Amniotic fluid index is an accurate and reproducible method of estimating Amniotic fluid volume.The test has good correlation with abnormal FHR pattern, meconium staining of liquor, low Apgar score, caesarean section for foetal distress and admissions in neonatal intensive care unit.

INTRODUCTION:

Oligohydramnios identified by AFI has been used as an indicator of chronic uteroplacental insufficiency and has been associated with increased risk of meconium staining,abnormal foetal heart rate tracings.(Chamberlain)[1] and operative interventions(Sarno et al)[2].Ours being a tertiary care centre majority are referred high risk patients with a scan report of AFI<5,hence the present study was undertaken to evaluate the perinatal outcome in these patients.

METHODOLOGY:

This study was conducted in the department of Obstetrics and Gynaecology, ACME, Pariyaram,to evaluate the usefulness of Amniotic fluid index, a semiquantitative technique of assessing Amniotic fluid volume, in one hundred consecutive patients diagnosed to have Pregnancy induced Hypertension and admitted in the hospital, in predicting perinatal outcome.

Criteria for Inclusion:

1. Patients diagnosed to have Pregnancy induced hypertension.
2. Well documented duration of pregnancy.
3. Singleton pregnancy.

Criteria for Exclusion:

1. Previous caesarean section.
2. Premature rupture of membranes.
3. Known congenital abnormalities of the foetus.
4. Multifoetal gestation.
5. Abnormal presentation(breech, transverse lie, oblique lie)

A detailed history and examination of these patients was done, the diagnoses of pregnancy induced hypertension was done according to the recommendations of A.C.O.G.

An initial ultrasound for detailed antenatal foetal assessment was done for estimation of gestational age, placenta, amniotic fluid index and foetal biophysical profile. Protocol or subsequent antepartum surveillance included biweekly NST, weekly amniotic fluid index determination. Foetal growth evaluation was done at weekly intervals. **Amniotic fluid index (Phelan et al)**[3] was determined by the four quadrant technique with a linear transducer (3.5 Mega Hertz) head of a B-Mode real time scanner by dividing the uterine cavity into four quadrants utilizing the linea nigra as the vertical axis and the umbilicus as the horizontal axis, in each quadrant the pocket of amniotic fluid with greatest vertical depth is measured.<5 - Oligohydramnios. 5-8 –Borderline. 8-24 –Normal. >24 - Polyhydramnios Patients were followed up until delivery and foetal outcome was noted in respect to :

1. Mode of delivery-normal vaginal ,vaginal instrumental, caesarean section.
2. Incidence of foetal distress in labour.
3. Incidence of Meconium staining of liquor.
4. Perinatal morbidity and mortality.

Perinatal outcome was considered to be abnormal when any one or combination of the following parameters were present. 1)APGAR score of less than 7 at 5mins.2)Thick meconium staining of amniotic fluid.3) Respiratory complication within 72 hours of birth.4)Perinatal death.

Statistical analysis:

Descriptive data are presented as number and percentages with mean and standard deviation wherever required. Chi-square test was used for analyzing categorical data. Student's 't' test was used for comparing mean between two groups.A p-value of less than 0.05 was considered statistically significant.

OBSERVATION AND ANALYSIS

Table 1: Distribution of cases according to the severity of PIH:

	No	%
Mild PIH	62	62%
Severe PIH	38	38%
Total	100	100%

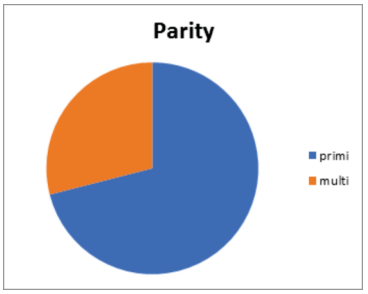
Table2: Nature of admission:

	Frequency	%
Booked	35	35%
Emergency	65	65%
	100	100%

Most of the cases being referred, hence emergency constitutes majority.PIH constitutes 70% of our High risk cases, hence study done on 100 PIH patients.

Table 3: Severity of PIH and parity:

Parity	Mild PIH		Severe PIH		Total
	No	%	No	%	
Primi	45	72.5%	26	68.4%	71%
Multi	17	27.4%	12	31.5%	29%
Total	62	100%	38	100%	100%



In my study population 71% were primigravidas and 29% were multigravidas.

Table 4:Gestational age of the patients:

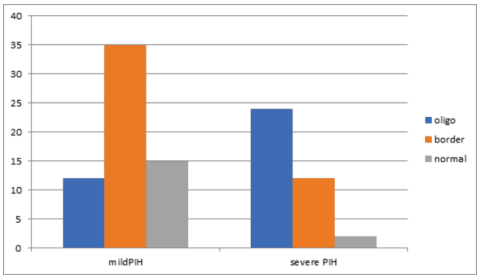
Gest age	Mild PIH		Severe PIH		Total
	No	%	No	%	%
30-32wk			11	28.9%	11%
33-36wk	33	53.2%	23	60.5%	56%
>37wk	29	46.7%	4	10.5%	33%

Minim=30;Maxim=39;Mean=35.49;Std deviation=2.134

Majority of belonged to gestational age of 33- 36 weeks. 28.9% of patients of severe PIH belonged to gestational age of 30-32weeks.

Table 5: Amniotic fluid index in 100 patients:

AFI	Mild PIH		Severe PIH		Total
	No	%	No	%	%
Oligo	12	33.3%	24	66.7%	36
Border	35	74.5%	12	25.5%	47
Normal	15	88.2%	2	11.8%	17



The incidence of oligohydramnios in my study was 36%.The incidence of oligohydramnios is 33.3% in mild PIH and 66.7%in severe PIH.88.2% of patients with mild PIH had normal amniotic fluid index, whereas only 11.8% of patients with severe PIH had a normal amniotic fluid index. The relationship between severe PIH and oligohydramnios is statistically significant. P value<0.001.

Table 6: Relationship between Induced/Spontaneous and AFI

	Oligo		Border		Normal		Total	
Induced	30	93.8%	30	65.2%	9	52.9%	69	72.6%
Spontaneous	2	6.3%	16	34.8%	8	47.1%	26	27.4%
Total	32	100%	46	100%	17	100%	95	100%

Since my study involves High risk cases the induction rate is definitely higher, but when a comparison is done between oligohydramnios and induction, it definitely shows statistical significance P value<0.005.

TABLE 7: Correlation between AFI, Mode of delivery and severity of PIH

AFI	Mode of delivery	Mild PIH		Severe PIH		Total	
		No	%	No	%	No	%
Oligo	Vaginal	3	25%	5	20.83%	8	22.22%
	Instrumental	1	8.33%	1	4.16%	2	5.55%
	Caesarean	8	66.66%	18	75%	26	72.22%
Border	Vaginal	29	82.86%	4	33.33%	33	70.21%
	Instrumental	2	5.71%	1	8.33%	3	6.38%
	Caesarean	4	11.42%	7	58.33%	11	23.40%
Normal	Vaginal	12	80%	1	50%	13	76.47%
	Instrumental	2	13.33%	0	0%	2	11.76%
	Caesarean	1	6.66%	1	50%	2	11.76%

This analysis showed that in the oligohydramnios group 72.22% delivered by caesarean section. Only 22.22% delivered vaginally and 5.55% had vaginal instrumental delivery. When the mode of delivery is compared to the severity of disease, it is not found to be statistically significant. In the Borderline group 82.86% of patients with mild PIH had normal vaginal delivery, whereas 58.33% of patients with severe PIH underwent caesarean section.

In the normal AFI group 76.47% patients had normal vaginal delivery.The difference in the mode of delivery between mild and severe PIH is not statistically significant.The incidence of caesarean section is 39%,with the incidence being 20.96% in mild PIH and 68.42% in severe PIH. The most common indication for caesarean section was found to be foetal distress which accounted for 51.28%

Table 8: Correlation between AFI, NST and severity of PIH:

AFI	NST	Mild PIH		Severe PIH		Total	
Oligo	NR	7	58.3%	15	71.4%	22	66.7%
	R	5	41.7%	6	28.6%	11	33.3%
Border	NR	4	11.4%	7	58.3%	11	23.4%
	R	31	88.6%	5	41.7%	36	76.6%
Normal	NR	0	0%	1	50%	1	5.9%
	R	15	100%	1	50%	16	94.1%

The incidence of Non-reactive NST in the oligohydramnios group was 66.7% of which 71.4% of cases were of severe PIH. In the normal AFI group 100% of patients of mild PIH had a Reactive NST whereas in severe PIH 50% were Non-Reactive.

Table9: Correlation between AFI, colour of liquor and severity of PIH:

AFI	Colour of liquor	Mild PIH		Severe PIH		Total
		No	%	No	%	
Oligo	Clear	2	18.2%	4	19%	6(18.8%)
	Thin	3	27.3%	5	23.8%	8(25.0%)
	Thick	6	54.5%	12	57.1%	18(56.3%)
Border	Clear	19	54.3%	3	25%	22(46.8%)
	Thin	11	31.4%	6	50%	17(36.2%)
	Thick	5	14.3%	3	25%	8(17.0%)
Normal	Clear	13	86.7%	1	50%	14(82.4%)
	Thin	2	13.3%	0	0%	2(11.8%)
	Thick	0	0%	1	50%	1(5.9%)

The incidence of thick meconium stained liquor in the oligo group was 56.3% whereas in the borderline group and normal it was 17% and 5.9%respectively.This difference was statistically significant with a Chi-square value 27.32 and P value<0.001.

Table10: Correlation between AFI, Apgar score and severity of PIH:

AFI	Mild PIH		Severe PIH		Total	
	<7/10	>7/10	<7/10	>7/10	<7/10	>7/10
Oligo	8 (66.7%)	4 (33.3%)	20 (83.3%)	4 (16.7%)	28 (77.7%)	8 (22.2%)
Border	4 (11.4%)	31 (88.6%)	5 (41.7%)	7 (58.3%)	9 (19.1%)	38 (80.9%)
Normal	1 (6.7%)	14 (93.3%)	1 (50%)	1 (50%)	2 (11.8%)	15 (88.2%)

.P value<0.001.

The incidence of low Apgar score in the oligohydramnios

group was 77.7%, whereas in the borderline group it was only 19.1% and 11.8% in the normal group respectively. This shows there is significant association with Chi-square value 34.67 and P value<0.001.

Table 11: Correlation between AFI and Birth weight:

AFI * Birth_Weight Crosstabulation

			Birth_Weight		
			Low Birth Weight	Normal Birth Weight	Total
AFI	Oligo	Count	31	4	35
		% within Birth_Weight	53.4%	9.8%	35.4%
	Border	Count	23	24	47
		% within Birth_Weight	39.7%	58.5%	47.5%
	Normal	Count	4	13	17
		% within Birth_Weight	6.9%	31.7%	17.2%
Total		Count	58	41	99
		% within Birth_Weight	100.0%	100.0%	100.0%

Chi-square value=23.38 and Pvalue<0.001.

Table12: Correlation between AFI and Evidence of Foetal distress:

AFI	NR NST	Thick meconium	Apgar<7.5	NICU observation	Complications
Oligo	22(66.7%)	18(56.3%)	28(77.7%)	3	13
Border	11(23.4%)	8(17%)	9(19.1%)	15	5
Normal	1(5.9%)	1(50%)	2(11.8%)	1	1

Table 13: Correlation between AFI and duration of stay in NICU:

AFI	1 week	2 week	3week	4week&more
Oligo	14	5	6	3
Border	3	1	3	-
Normal	1	-	-	-

Table 14: Correlation between AFI and Perinatal morbidity:

AFI	MAS	RDS	Septicaemia	Hyperbilirubinemia	Hypoglycemia
Oligo	4	2	2	3	2
Border	1	-	1	2	1
Normal	1	-	-	-	-

Perinatal morbidity and mortality ,NICU stay and complicat ions were more in the Oligohydramniosgroup

DISCUSSION:

Antepartum foetal surveillance with a Non stress test and Amniotic fluid index has become an integral component in the management of pregnancies at risk of adverse perinatal outcome[4].AFI provides a quantitative assessment and is proportionate to the total amniotic fluid volume. It is well established that low amniotic fluid index is associated with adverse perinatal outcome(Rutherford et al)[5]. Our study was undertaken to determine the accuracy of antepartum Amniotic fluid index as a predictor of adverse perinatal outcome at birth in high risk pregnancies.

The study population consisted of 62 patients with mild PIH and 38 patients with severe PIH. Most of them were primigravidas (71%), a fact which is emphasized by Chesley et al (1985)[6]. Most of them were in the gestational age of 33-36weeks (56%), only 33% belonged to >37 weeks gestation as severe PIH mainly is noted remote from term.

The incidence of oligohydramnios in my study was found to be 36%.

My study is comparable to study done by O'Brien[7],when the severity of PIH is taken into consideration, the incidence of oligohydramnios in mild PIH is 33.3% and in severe PIH is 66.7%.In the study done by O'Brien et al this incidence of mild and severe PIH was 14% and 39% respectively. This proves that the incidence of oligohydramnios is related to the severity of the disease and the difference is statistically very significant. P value<0.001.The study is also comparable to one done by Sultana S[8].

Since my study involves mainly high risk pregnant women the induction rate was higher but when a comparison is done between induction rate and oligihydramnios it is definitely higher in the oligohydramnios group(93.8%).This is comparable to study done by Barilleux PS[9] et al, Bastide A[10] et al (1986), Manzanares S, Carillo MP[11], et al(2007), Chhabra S[12], Dargan R (2007), Ahmad H[13], Munim S(2009) and Magann EF[14], Doherty D A(2010).

Regarding the mode of delivery it was found that in the oligohydramnios group 72.22% delivered by caesarean section whereas22.22% delivered vaginally and 5.55% delivered by vaginal instrumental. There was no statistically significant difference in the mode of delivery in the oligohydramnios group when the severity of PIH was taken into consideration, this indicates that amniotic fluid index is an important criteria influencing the mode of delivery. This is comparable to the study done by Alchalabi HA, Obeidat BR (2006).

The total incidence of caesarean section in my study was 39% with the incidence being 20.96% in mild PIH and 68.42% in severe PIH. The commonest indication was Foetal distress which accounted for 51.28% of the cases and most of these patients had oligohydramnios (65%).This is comparable to the study done by Varma TR, Bateman S(1988)where the incidence of caesarean section was 48%. According to Yucesoy , Ozkan S, et al caesarean section rate was found to be 58.8% in severe PIH with foetal distress being the indication in 69cases i. e 46%.

The incidence of non re-assuring foetal heart rate pattern was found to be 66.7% in the oligohydramnios group, 23.4% in the borderline group and only 5.9% in the normal AFI group.71.4% of the Non- reactive NST in the oligohydramnios group was found in severe PIH. These findings corresponded to the study done by Ott WJ (2005), Voxman EG, Tran S(2002) and Maslovitz S[8], Shenhar M et al (2009).

The incidence of thick meconium stained liquor was 56.3% in the oligohydramnios group whereas it was only 17% in the borderline and 5.9% in the normal group respectively. This difference was statistically significant with a Chi-square value of 27.32 and P value<0.001.This was also found in study done by Odongo BE[9](2010) Shaikh EM, Mehmood S (2010) and Kumari R Srichand P[10](2012).

The incidence of low Apgar score was 77.7% in the oligohydramnios group. In the borderline and normal group it was 19.1% and 11.8% respectively. This indicates that oligohydramnios is associated with low Apgar scores in neonates and this is statistically significant with a Chi-square value of 34.67 and P value<0.001.This finding was similar to the study by Dizon-Townson D, Kennedy KA, Dildy GA et al (1996) and Anandakumar C, Biswas A, Arulkumaran S et al (1993).

The percentage of low birth weight babies detected was 58 in my study of 100 PIH patients i.e. a birth weight of <2.5kg.88.5% of neonates of patients who had oligohydramnios were below 2.5kg age.The perinatal morbidity and mortality were higher in the oligohydramnios group.

CONCLUSION :

The four quadrant technique of Amniotic fluid index is an accurate and reproducible method of estimating Amniotic fluid volume. The test has good correlation with abnormal foetal heart rate pattern, meconium staining of liquor, low Apgar score, caesarean section for foetal distress and

admissions to neonatal intensive care unit. Obstetric decision making can be relied on AFI in many high risk clinical situations during pregnancy.

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