

# A study of effect of amniotic fluid index on mode of delivery

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## Abstract

**Introduction:** Amniotic fluid (AF) is a marvelously complex and dynamic milieu that changes as pregnancy progresses. AF contains nutrients and growth factors that facilitate fetal growth, provides mechanical cushioning and antimicrobial effectors that protect the fetus, and allows assessment of fetal maturity and disease. Amniotic fluid is an important factor in the prediction of fetal survival. **Aims and objectives:** To study the effect of amniotic fluid index on mode of delivery. **Materials and method:** The present study was conducted in the department of Obstetrics and Gynaecology, ACPM medical college, Dhule. Total 200 antenatal women were registered in the study. In each case detailed history was taken as per proforma at the time of admission. The General, systemic and obstetric Examination was performed in all patients. Amniotic fluid measurements were performed in all the study mothers by ultrasound on targeted patients and were divided in three groups (oligohydramnios, borderline and normal). All the mothers were followed up to the delivery and mode of delivery complication if any in neonates were recorded and were compared in the group. **Results:** 50.9% mothers of Group I delivered by cesarean delivery. In present study total 40 mothers delivered by cesarean section out of these majority of the mothers were of group I (27). In group I, Out of 27 mothers 23(85.2%) had fetal distress, 2 (7.4%) had CPD and 1(3.7%) each had postdated or prolonged labour as indication of cesarean section. Out of total 53 mothers from AFI group I, 2(3.8%) neonates developed RDS, 6(11.3%) had jaundice while VSD, infection, septicemia and VLBW was diagnosed in 1(1.9%) neonate each. One neonate from each group I and Group II of AFI index had died while rest all had survived. **Conclusion:** Thus we conclude that oligohydramnios is associated with increased rate of cesarean section with fetal distress as most common indication. And also associated with increased incidence of complication in neonates. Thus Amniotic fluid index measurement can be used as a useful indicator for fetal surveillance to identify those neonates at risk for poor perinatal outcome.

**Key words:** amniotic fluid index, cesarean section, fetal distress.

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## INTRODUCTION

Nature has made floating bed in foam of amniotic fluid cavity filled with liquor amnii for the requirement of fetus, for its existence and growth in sterile environment, regulation of temperature, avoidance of

external injury and reduction of impact of uterine contractions.<sup>1</sup> Pregnancy is a unique experience in every woman's life. The thought of a growing fetus with adequate amniotic fluid volume (according to gestational age) in the mother's womb, indeed is nature's way of expressing the attributes of motherhood, so adequate amniotic fluid volume is essential for the normal growth and well-being of the fetus.<sup>2</sup> Amniotic fluid (AF) is a marvelously complex and dynamic milieu that changes as pregnancy progresses. AF contains nutrients and growth factors that facilitate fetal growth, provides mechanical cushioning and antimicrobial effectors that protect the fetus, and allows assessment of fetal maturity and disease.<sup>3</sup> Amniotic fluid is an important factor in the prediction of fetal survival.<sup>4</sup> Reduction in amniotic fluid early in the gestational age can interfere with symmetrical fetal

development leading to structural malformations. These include cranial, facial and skeletal deformities and pulmonary hypoplasia. Deformities associated with oligohydramnios include dolicocephaly, Potter's I, II, III, arthrogryposis, talipes equino varus, pulmonary hypoplasia. Late onset oligohydramnios is a risk factor for poor perinatal outcome. There is increased incidence of meconium stained liquor, abnormal FHR tracing, low Apgar score, low birth weight, admission to NICU, birth asphyxia and cesarean section for fetal distress. However, most of the problems occur during intrapartum period and hence careful intra partum fetal monitoring is necessary.<sup>5</sup>

## AIMS AND OBJECTIVES

To study the effect of amniotic fluid index on mode of delivery.

## MATERIALS AND METHOD

The present study was conducted in the department of Obstetrics and Gynaecology, ACPM medical college, Dhule. The study was conducted from June 2012 to October 2013 after approval of institution ethical committee. Following inclusion and exclusion criteria used to select the study subjects to evaluate the amniotic fluid volume.

### Inclusion Criteria

- Singleton Pregnancy
- Gestational age more than 37 weeks
- Presence of intact membrane

### Exclusion Criteria

- Multifetal Gestation
- Associated fetal anomalies
- Polyhydramnios

Thus by using above mentioned inclusion and exclusion criteria total 200 antenatal women were registered in the study. In each case detailed history was taken as per proforma at the time of admission. The General Physical Examination of patients was done. Obstetric examination of the patient was done thereafter by examination of the fundal height, abdominal girth, fundal grip, lateral grip both pelvic grip, to know the lie, attitude, presentation and the fetal heart was auscultated. Amniotic fluid measurements were performed in all the study mothers by ultrasound on targeted patients. Equipment used in this study included TOSHIBA nemio XG model machine which was equipped with 3.75 and 7.5 MHz curvilinear transducers. EFW Calculated by Hadlock 1 formula. Then a four quadrant amniotic fluid was assessed by placing a linear ultrasound transducer perpendicular to the wall of uterus and parallel to mother's spine in four abdominal quadrants and measuring the largest vertical amniotic fluid pocket.

Pockets consisting primarily of umbilical cord are disregarded. A four quadrant sum of less than or equal to 5 cms, or more than or equal to 25 cms was considered as abnormal.

### Grouping of patients is as follows

1. Group I AFI  $\leq$  5 cms - oligohydramnios
2. Group II AFI 5.1 – 8 cms borderline
3. Group III AFI 8.1 – 20 cms – normal

All the mothers were followed up regularly till the termination of pregnancy. Various mode of delivery such as Induced and spontaneous labor. Various indications for cesarean section were recorded. Any complication observed in the neonate was diagnosed and treated accordingly. The collected data was analysed using Statistical Product and service solution V 16, SPSS software. Parameters were presented in frequency and percentage distribution form.

## RESULTS

**Table 1:** Grouping of mothers according to amniotic fluid index (AFI)

Group	Amniotic fluid Index (AFI)	Frequency	Percent
I	$\leq$ 5 (Oligo-hydramnios)	53	26.5
II	5.1 to 8 (Borderline)	47	23.5
III	8.1 to 20 (Normal)	100	50.0
<b>Total</b>		<b>200</b>	<b>100.0</b>

In the present study total 200 ANC were enrolled and AFI was calculated in all the mothers. It was observed that 50% mothers were having normal AFI, whereas 26.5% mothers were having AFI less than 5 thus were diagnosed as Oligo-hydramnios.

**Table 2:** Distribution of Amniotic fluid Index according to mode of delivery

Mode of delivery	Group			Total
	I	II	III	
Cesarean Delivery	27 (50.9%)	8 (17%)	5 (5.0%)	40 (20%)
Instrumental delivery	7 (13.2%)	4 (8.5%)	6 (6.0%)	17 (8.5%)
Normal delivery	19 (35.8%)	35 (74.5%)	89 (89.0%)	143 (71.5%)
<b>Total</b>	<b>53 (100.0%)</b>	<b>47 (100.0%)</b>	<b>100 (100.0%)</b>	<b>200 (100.0%)</b>

$\chi^2=52.712$ ,  $p < 0.01$  (significant)

It was seen that 50.9% mothers of Group I delivered by cesarean delivery, 13.2% had instrumental and rest 35.8% delivered by normal delivery. In Group II 17% mothers had cesarean and 8.5% had instrumental delivery while in Group III only 5% mothers needed caesarian section and 6% needed instrumental delivery while maximum i.e. 89% had normal delivery. There was statistically highly significant ( $p < 0.01$ ) difference of the mode of delivery in the three AFI groups.

**Table 3:** Distribution of Amniotic fluid index according to indication of caesarian delivery

Indication of caesarian section	Group			Total
	I (n=27)	II (n=8)	III (n=5)	
DTA	0	0	1 (20%)	1 (2.5%)
CPD	2 (7.4%)	0	1 (20%)	3 (7.5%)
FD	23 (85.2%)	4 (50%)	3 (60%)	30 (75%)
Non Progressive	0	1 (12.5%)	0	1 (2.5%)
Postdated	1 (3.7%)	1 (12.5%)	0	2 (5.0%)
Prolonged Labour	1 (3.7%)	2 (25%)	0	3 (7.5%)

In present study total 40 mothers delivered by cesarean section out of these majority of the mothers were of group I (27). In group I, Out of 27 mothers 23(85.2%) had fetal distress, 2 (7.4%) had CPD and 1(3.7%) each had postdated or prolonged labour as indication of cesarean section. Out of 8 mothers of group II, 1 (12.5%) had Non progressive labour and postdated delivery. 2(25%) had prolonged labour while fetal distress was noted in 4(50%) mothers. In AFI group III 1(20%) mother needed caesarian section due to DTA and CPD each and 3 mothers i.e. 60% needed due to Fetal distress.

**Table 4:** Distribution of Amniotic fluid Index according to complication

Complication	Group			Total
	I	II	III	
RDS	2 (3.8%)	2 (4.3%)	1 (1.0%)	5 (2.5%)
VSD	1 (1.9%)	0	0	1 (0.5%)
Infection	1 (1.9%)	0	0	1 (0.5%)
Jaundice	6 (11.3%)	0	1 (1.0%)	7 (3.5%)
VLBW	1 (1.9%)	0	0	1 (0.5%)
Septicemia	1 (1.9%)	0	0	1 (0.5%)
No Complication	41 (77.3%)	45 (95.8%)	98 (98.0%)	184 (92%)
<b>Total</b>	<b>53 (100.0%)</b>	<b>47 (100.0%)</b>	<b>100 (100.0%)</b>	<b>200 (100.0%)</b>

Out of total 53 mothers from AFI group I, 2(3.8%) neonates developed RDS, 6(11.3%) had jaundice while VSD, infection, septicemia and VLBW was diagnosed in 1(1.9%) neonate each. Out of 47 mothers from AFI group II 2(4.3%) neonates had RDS. While out of 100 mothers from group III 1% neonates had RDS and jaundice each.

**Table 5:** Distribution of Amniotic fluid index according to neonatal outcome

Neonata I outcome	Group			Total
	I	II	III	
Death	1 (1.9%)	1 (2.1%)	0	2 (1%)
Survived	52 (98.1%)	46 (97.9%)	100 (100.0%)	198 (99%)
<b>Total</b>	<b>53 (100.0%)</b>	<b>47 (100.0%)</b>	<b>100 (100.0%)</b>	<b>200 (100.0%)</b>

$\chi^2 = 2.035, p=0.362$  (not significant)

One neonate from each group I and Group II of AFI index had died while rest all had survived. There was statistically no significant ( $p>0.05$ ) difference of the mortality status of the neonates according to the AFI groups of mothers.

## DISCUSSION

In the present study total 200 ANC were enrolled and AFI was calculated in all the mothers. It was observed that 50% mothers were having normal AFI, whereas 26.5% mothers were having AFI less than 5 thus were diagnosed as Oligo-hydramnios. It was seen that majority of the mothers of group I (50.9%) delivered by cesarean delivery whereas 13.2% had instrumental and rest 35.8% delivered by normal delivery. In Group II 17% mothers had cesarean and 8.5% had instrumental delivery while in Group III only 5% mothers needed caesarian section and 6% needed instrumental delivery while maximum i.e. 8 9% had normal delivery. The difference in various mode of delivery was also statistically significant. Hoskin and associates<sup>6</sup> also reported cesarean section as major mode of delivery in oligohydramnios in their study. In present study total 40 mothers delivered by cesarean section. Out of these majority of the mothers were of group I (27). In group I, Out of 27 mothers 23(85.2%) had fetal distress, 2 (7.4%) had CPD and 1(3.7%) each had postdated or prolonged labour as indication of cesarean section. Out of 8 mothers of group II, 1 (12.5%) had Non progressive labour and postdated delivery. 2(25%) had prolonged labour while fetal distress was noted in 4(50%) mothers. In AFI group III 1(20%) mother needed caesarian section due to DTA and CPD each and 3 mothers i.e. 60% needed due to Fetal distress. Thus the indication of caesarean delivery for fetal distress was 85.2% among oligohydramnios group. but the incidence was much more as compared to the incidence reported by Raj Sriya *et al* (43.05%)<sup>7</sup>, Rutherford *et al*<sup>8</sup> (11%) and Sarno *et al*<sup>9</sup> (11.9%). It was seen that Out of total 53 mothers from AFI group I, 2(3.8%) neonates developed RDS, 6(11.3%) had jaundice while VSD, infection, septicemia and VLBW was diagnosed in 1(1.9%) neonate each. In the present study incidence of

low birth weight (<2.5kg) was 39.6% in oligohydramnios group (group I) and 22.0% in normal group (group III) whereas 58.38% and 36.11% respectively in the study conducted by Raj Sriya *et al*<sup>7</sup>. But the high incidence of low birth weights in oligohydramnios suggests the association between them. The association can be explained by placental insufficiency which is a causative factor in both of them. Out of 47 mothers from AFI group II 2(4.3%) neonates had RDS. While out of 100 mothers from group III 1% neonates had RDS and jaundice each. Thus the complication rate in neonates of group I was much more as compared to other groups. The higher complication rate was also increased the NICU admission rate in these neonates. Raj Sriya *et al*<sup>7</sup> and Baron C *et al*<sup>10</sup> also reported similar findings in their study. One neonate from each group I and Group II of AFI index had died while rest all had survived. There was statistically no significant ( $p>0.05$ ) difference of the mortality status of the neonates according to the AFI groups of mothers. Chandra P *et al*<sup>11</sup> used AFI for fetal surveillance in their study and observed that amniotic fluid volume assessment was very helpful in predicting the perinatal outcome. The incidence of birth asphyxia, neonatal complications, low 5 min Apgar score, LSCS for fetal distress were increased and mean birth weight was low. S. Manzanares *et al*<sup>12</sup> in their study concluded that active induction of labour in term low risk gestations with isolated oligohydramnios translated into higher labour induction, operative vaginal delivery and caesarean section rates.

## CONCLUSION

Thus we conclude that oligohydramnios is associated with increased rate of cesarean section with fetal distress as most common indication. And also associated with increased incidence of complication in neonates. Thus Amniotic fluid index measurement can be used as a useful indicator for fetal surveillance to identify those neonates at risk for poor perinatal outcome.

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