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## Original Research Article

# Amniotic fluid index versus maximum vertical pocket measurement in predicting perinatal outcome at 40 weeks or beyond

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## ABSTRACT

**Background:** The aim of this study is to compare the use of amniotic fluid index with maximum vertical pocket for predicting perinatal outcomes.

**Methods:** The present study was a prospective observational study and includes 140 The study include normal antenatal women at gestational age 40 weeks or beyond (by last menstrual period/1<sup>st</sup> trimester scan) referred from antenatal between 20 to 40 years were enrolled in this study from 2015 to 2017. After Institutional Ethics Committee approval all recruited women was assessed at the 3<sup>rd</sup> trimester visit for baseline demographic and obstetric data. After taking a detailed history and examination the women were subjected to ultrasonography for Amniotic Fluid index (AFI) and Maximum vertical pocket (MVP). The women were divided into 2 groups based on measurement of AFI and MVP ultrasonologically. The correlation of Amniotic fluid index and Maximum vertical pocket with perinatal outcome were computed for the 2 groups: Group Ia - women having normal AFI and normal MVP; Group Ib - women having decreased AFI and normal MVP.

**Results:** In Group Ia, 31(34.44%) women were induced and in Group Ib 59 (65.56%) women were induced for oligohydramnios. 65 women (72.22%) had normal vaginal delivery versus 25women (27.28%) had undergone LSCS in Group Ia, while in Group Ib, 32 women (64%) versus 18 women (36%) had vaginal delivery and LSCS respectively. Higher rate of LSCS was observed in Group Ib. There was no significant difference in the rate of LSCS for fetal distress between Group Ia and Ib for fetal distress.

**Conclusions:** Amniotic fluid index (AFI) compared with the maximum vertical pocket (MVP) excessively characterizes patients as having oligohydramnios, leading to an increase in obstetric interventions, without any documented improvement in perinatal morbidity and mortality. Thus, authors cannot find any objective reason to favour AFI over MVP.

**Keywords:** Fetal distress, Hypertension in pregnancy, Stillbirths

## INTRODUCTION

Assessment of amniotic fluid volume (AFV) is an integral part of antenatal ultrasound evaluation during screening exams, targeted anatomy examinations, and in tests assessing fetal well-being. Abnormal AFV has been

associated with an increased risk of perinatal mortality and several adverse perinatal outcomes, including premature rupture of membranes (PROM), fetal abnormalities, abnormal birth weight, and increased risk of obstetric interventions by Harman CR.<sup>1</sup> The ultimate goal of antepartum surveillance program is to improve

perinatal outcome and to decrease intrauterine fetal demise besides prevention of maternal morbidity and mortality by Yeo et al, Liston R et al.<sup>2,3</sup> A fetus in distress should be identified at the earliest so that timely delivery will not only salvage the fetus but also prevent long term neurological impairments such as injury to fetal central nervous system by Baschat AA et al.<sup>4</sup> These risk increases from the expected date of confinement (40 weeks of gestation) as placental insufficiency and post-maturity (greater than 42 weeks of gestation) are associated with an exponential increase in the risk of perinatal death by Bergsjø.<sup>5</sup> Delivery beyond 42 weeks is associated with a fourfold increase in death in utero, as well as a threefold increase in neonatal death compared with delivery at term by Crowley P.<sup>6</sup> In addition to mortality, there is an increased risk of meconium aspiration syndrome, neonatal seizures and long term handicap by Minchom P.<sup>7</sup> Amniotic fluid assessment by ultrasound is one of the important tools in assessing the fetal health in all risk categories especially beyond the period of viability by Nash P.<sup>8</sup> Though there are several ways by Dubil EA to assess quantity of amniotic fluid ranging from clinical palpation to measurement of single deepest vertical pocket Nabhan AF et al, amniotic fluid index (AFI) by four-quadrant technique as described by Phelan et al.<sup>9-11</sup> At term, oligohydramnios increases the risk of labor induction, the deceleration in fetal heart rate (FHR) tracings during labour, and recourse to cesarean delivery. Its effect on adverse neonatal outcome is less clearly documented by Locatelli et al.<sup>12</sup> Thus, the present study was carried out in an effort to assess relation of maximum vertical pocket and amniotic fluid index with perinatal outcome.

## METHODS

### Inclusion criteria

- The present study was a prospective observational study and includes 140 pregnant women with known last menstrual period, history of regular menstruation, singleton pregnancy, gestational age from 40 weeks or beyond and aged between 20 and 40 years.

### Exclusion criteria

- The exclusion criteria were history of gestational hypertension, diabetes mellitus, intrauterine growth restriction, hydrops fetalis, congenital malformations, twins, polyhydramnios and premature rupture of membranes.

After approval by Institutional Ethics Committee all recruited women were observed for baseline demographic and obstetric data including age, parity and past medical events at first antenatal visit. After taking a detailed history and examination all women provided an informed written consent and underwent ultrasound evaluation for Amniotic Fluid index (AFI) and Maximum vertical

pocket (MVP). The women were divided into 2 groups based on measurement of AFI and MVP ultrasonologically:

- Group Ia - women having normal AFI and normal MVP.
- Group Ib - women having decreased AFI and normal MVP.

The correlation of amniotic fluid index and maximum vertical pocket with perinatal outcome were computed for the 2 groups. The primary outcome measures were presence of meconium, rate of diagnosis of oligohydramnios, Apgar score at 1 and 5 minutes, birth weight, admission to NICU, neonatal morbidity and mortality and number of perinatal death while secondary outcome were induction of labor, mode of delivery and rate of caesarean section for fetal distress. The correlation of amniotic fluid index and maximum vertical pocket with perinatal outcome were computed for the 2 groups. P values of less than 0.05 were considered statistically significant.

## RESULTS

In the present study, total of 140 antenatal women were included after fulfilling the inclusion and exclusion criteria. The women were divided into 2 groups based on measurement of AFI and MVP ultrasonologically. Maternal baseline characteristics were similar between the two groups in terms of age, parity and gestational age (Table 1).

**Table 1: Demographic profile of the study subjects.**

Parameters	Group Ia (n= 90)	Group Ib (n=50)	p-value
<b>Age (years) (mean±SD)</b>	24.63±4.13	24.06±2.98	0.57
<b>Gravidity</b>			
Primi	39 (43.3%)	21 (42%)	0.9
Multi	51 (56.7%)	29 (58 %)	
<b>Gestational age</b>			
≥40weeks	66 (73.3)	37 (74)	
≥41weeks	14 (15.6)	09 (18)	
≥42weeks	10 (11.1)	04 (8)	

In Group Ia, out of 90 women about 31 (34.44%) were induced and 59 (65.56%) women spontaneously progressed into labour.

**Table 2: Rate of diagnosis of oligohydramnios and induction of labour.**

Induction of labour	Group Ia (n= 90)		Group Ib (n=50)		p-value
	No.	%	No.	%	
Yes	31	34.44	50	100	0.0001
No	59	65.56	00	000	0.0001
Total	90	100	50	100	

In Group Ib, 50 (100%) women were induced for oligohydramnios diagnosed on the basis of decreased AFI (<5cm) and had normal MVP ( $\geq 2$ cm). Hence AFI increases the rate of diagnosis of oligohydramnios and labour induction (Table 2).

**Table 3: Mode of delivery.**

Mode of delivery	Group Ia (n= 90)		Group Ib (n=50)	
	No.	%	No.	%
VD	65	72.22	32	64
LSCS	25	27.78	18	36
Total	90	100	50	100

$\chi^2 = 1.02, p = 0.312$

Present study shows that in Group Ia 72.22% (65 women) had normal vaginal delivery and 27.28% (25 women) undergone LSCS, while in Group Ib 64% (32 women) had vaginal delivery and 36% (18 women) had undergone LSCS. It was observed that Group Ia and Group Ib had no significant difference in mode of delivery (Table 3).

**Table 4: Indications for LSCS.**

Indication for LSCS	Group Ia		Group Ib	
	No.	(%)	No.	(%)
Fetal distress with MSAF	8	32	9	50
Fetal distress with non reassuring CTG	8	32	5	27.78
NPOL	5	20	3	16.67
Failed induction	4	16	1	5.55
Total	25	100	18	100

$\chi^2 = 1.99, p = 0.15$

As shown in Table 4, there was no significant difference in the rate of LSCS for fetal distress ( $p = 0.15$ ). The mean birth weight in present study was  $2.96 \pm 0.36$  and there was no significant difference between the birth weights of the two groups. The mean  $\pm$ SD of Apgar score at 1 minute was  $7.10 \pm 0.30$  and at 5 minutes was  $8.14 \pm 0.355$ .

There was no significant difference between the groups for Apgar score ( $p = 0.9$ ). In present study, 2 neonates were admitted in NICU and died later due to valvular heart disease. However, there was no statistical difference between the groups ( $p = 0.7$ ) (Table 5).

**Table 5: Neonatal outcome.**

Neonatal outcome	Group Ia	Group Ib	P value
Birth weight	2.96	2.99	0.6
Meconium	8	9	0.1
Apgar Score <7 at 5 mins	0	0	0.9
NICU Admission	1	1	0.7
MAS	0	0	00
Neonatal morbidity and mortality	1	1	0.7
Perinatal death	1	1	0.7

## DISCUSSION

In the present study, total of 130 pregnant women were evaluated. They were randomly divided into two groups: 90 women in Group Ia, 40 women in Group Ib. The study groups were similar in view of demographic characteristics including maternal age, gravidity and gestational age.

In Group Ia, out of 90 women about 31(34.44%) cases were induced. In Group Ib, 50(100%) women were induced for oligohydramnios diagnosed on the basis of decreased AFI (<5cm) and normal MVP ( $\geq 2$  cm). Present study is in accordance with AF Nabhan and Kehl S et al and they also concluded that use of AFI increased the rate of diagnosis of oligohydramnios and labour induction for oligohydramnios without improving perinatal outcome in comparison to MVP.<sup>10,13</sup> Nabhan AF states that the AFI method for fetal surveillance almost doubles the risk for induction of labour.<sup>10</sup>

It was observed in comparing Group Ia and Group Ib that there was no significant difference in mode of delivery. present findings are in accordance with Kehl S et al.<sup>13</sup> While comparing Group Ia and Group Ib, there was no significant difference in the rate of LSCS for fetal distress between the two groups ( $p = 0.15$ ). Moses et al study overall rate of caesarean deliveries for fetal distress was 4.8% and out of which 51% were in AFI group and 39% in MVP group and there was no difference in the neonatal outcomes for both the groups.<sup>14</sup>

There was no significant difference for the presence of meconium between Group Ia and Ib. present results are similar to Kehl S et al who observed no difference in presence of meconium and birth weight between the two groups.<sup>13</sup> However, Moses et al observed that there was no difference in the rate of meconium being present, but among the neonates with meconium, there was a higher proportion of thick meconium observed in the MVP monitored group.<sup>14</sup> There was no significant difference between the groups for Apgar score at 1 minute and 5 minutes.

## CONCLUSION

Amniotic fluid index compared with the maximal vertical pocket excessively characterizes patients as having oligohydramnios, leading to an increase in obstetric interventions, without any documented improvement in perinatal mortality and morbidity. However, there was no significant difference in predictability of cesarean section for fetal distress, low Apgar score. Thus, authors cannot find any objective reason to favor AFI over MVP.

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