
Amniotic Fluid Index as a Predictor of Perinatal Outcome in Patients with Prolonged Pregnancy

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Abstract

Objective: To determine whether detection of amniotic fluid index is clinically useful in the prediction of perinatal outcome in prolonged pregnancy.

Methods: Fifty pregnant women with prolonged pregnancies were subjected for ultrasonic assessment of amniotic fluid index and evaluation of perinatal outcome. The newborn babies were assessed for Apgar score, birth weight, meconium aspiration, intervention in labour for fetal distress, perinatal death, and admission to the neonatal care unit.

Results: Prolonged pregnancy with amniotic fluid index < 5 cm was significantly associated with meconium aspiration and caesarean section for fetal distress in labour with a *P* value of 0.009 and 0.030 respectively.

Conclusion: Amniotic fluid index can be considered as a useful technique for fetal surveillance in prolonged pregnancy.

Key words: Prolonged pregnancy, Amniotic fluid index, Perinatal outcome

Introduction:

Descriptive and retrospective studies indicate that prolonged pregnancy is associated with increased perinatal morbidity and mortality^[1].

The risk increases from the expected date of confinement (40 weeks of gestation) such that placental insufficiency and postmaturity (greater than 42 weeks of gestation) are associated with an increase in the risk of perinatal death^[2]. In addition to mortality, delivery beyond 42 weeks is associated with an increased risk of birth asphyxia, meconium aspiration syndrome, neonatal seizures and long-term handicap^[3].

The management of prolonged pregnancy is controversy. Current management strategies for prolonged pregnancy include labour induction seven or more days beyond the expected date of delivery or repeated monitoring of fetal wellbeing with delivery of those pregnancies in which there is concern before spontaneous labour. The later approach may be preferable if a sufficiently sensitive test to detect the 'at risk' fetus is available and is acceptable to the mother.

Fetal compromise due to gradual decline in placental function can be monitored by assessing the amniotic fluid index (AFI) in prolonged pregnancy, which decreases from normal value to rather severe oligohydramnios within 24 hours^[4, 5, 6]. Several studies have suggested that oligohydramnios detected by ultrasound is useful test for detecting placental insufficiency^[7, 8], so ultrasonographic assessment of amniotic fluid volume by calculating the AFI in prolonged pregnancy to detect oligohydramnios found to be helpful in identifying a postterm fetus in jeopardy^[9].

This study was conducted to determine whether detection of amniotic fluid index (AFI) is clinically useful in the prediction of perinatal outcome in prolonged pregnancy.

Patients & Methods:

During a period of one year starting from June 2001 through May 2002, fifty women with singleton pregnancies attending Al-kadimyia teaching hospital at 42-43 weeks of gestation were participated in the study. Labour was induced next morning. The expected date of delivery (EDD) was that calculated from menstrual dates or ultrasound in early pregnancy. Women with multiple pregnancy, a known or detected fetal malpresentation, a known or detected fetal abnormality or women with known medical diseases which could influence pregnancy outcome were excluded from the study.

The entire studied group was subjected to an ultrasonographic examination with a 3.5 MHz linear transducer. All measurements were made in a vertical plane with the transducer face parallel to the floor.

The AFI was derived by dividing the maternal abdomen into four quadrants using the umbilicus and the linea nigra as reference markers. Measurements of the deeper pool in each quadrant were summated.

After the confinement, details of the labour, delivery and perinatal outcome were recorded. These measures include, mode of delivery, Apgar score, stillbirth, perinatal death, meconium aspiration or birth asphyxia and admission to the neonatal care unit.

The obstetrician and paediatrician recorded the clinical notes.

Statistical analysis of the data was performed using the Chi-square and Anova test. Significance was considered when probabilities were < 0.05.

Results:

Fifty pregnancies diagnosed to be 42-43 weeks in duration were studied. Oligohydramnios as

defined by an AFI < 5 cm was diagnosed in 12 of these pregnancies. Maternal characteristics that included age and parity did not differ significantly among the pregnancies. All infants were live born and there were no perinatal deaths.

Analysis of the ante partum ultrasonic examination reveals that 12 (24%) of women had decreased AFI < 5 and 38 (76%) had normal AFI (5-25cm).

Table (1) shows the relation between AFI and gestational age. Women with 42 weeks gestational age have oligohydramnios in 7 cases while 28 cases

have normal AFI and women with 43weeks gestational age, oligohydramnios was evident in 5 cases of them and 10 patients have normal AFI. There was no significant relationship between oligohydramnios and gestational age $P = 0.25$.

Table (2) shows the mode of delivery in the study group. From the 50 women in the study, Spontaneous vaginal delivery occurred in 29 (58%) while assisted vaginal delivery was performed in 6 (12%) of women. The overall caesarean section was performed in 15 (30%) of cases and this was statistically significant P value 0.031

Table 1: The relation between AFI and gestational age

Gestational age	Normal AFI (5-25cm)	Oligohydramnios AFI < 5cm	Total
42 weeks	28	7	35
43 weeks	10	5	15
Total	38	12	50

Fisher exact test 0.42, P value = 0.25

Table 2: Mode of delivery

Mode of delivery	No.	(%)
Spontaneous vaginal delivery	29	58
Assisted vaginal delivery	6	12
Elective caesarean section	5	10
Emergency caesarean section	10	20
Total	50	100

Shown in table (3) are perinatal outcomes in postterm pregnancies with and without oligohydramnios. Mean birth weights were not significantly different between the study groups. AFI < 5 cm was significantly associated with caesarean section for fetal distress in labour (27% vs. 13%. $P = 0.030$). Meconium was found in the amniotic fluid of 16% of the postterm pregnancies with normal amniotic fluid volume. In contrast, Meconium-stained amniotic fluid was present in

42% of the postterm pregnancies with AFI < 5 cm. This difference was significant ($P = 0.004$). 33% of pregnancies with an AFI < 5 cm had meconium aspiration compared with 3% with an AFI > 5cm ($P = 0.009$). This means that an AFI < 5 cm is associated with a relative risk of a severely adverse outcome.

Apgar score of the newborn babies was assessed at 1 and 5 minutes and Apgar score below

7 at 5 minutes found in 3 babies. This was statistically not significant ($P = 0.340$).

Seven babies required admission to the neonatal care unit (NCU) which was statistically not significant ($P = 0.340$). In this study, there were

no recorded infants with features of the postmaturity syndrome.

Table 3: The relation between AFI and perinatal outcome

Outcome	AFI > 5 cm		AFI < 5cm		P-value
	No.(38)	%	No.(12)	%	
Mean (SD) birth weight (gm)	3469 (396)		3792 (557)		0.251
Caesarean section for fetal distress	2	13	4	27	0.030
Meconium stained amniotic fluid	6	16	5	42	0.004
Meconium aspiration	1	3	4	33	0.009
5 minute Apgar score < 7	1	3	2	16	0.340
Neonatal unit admission	1	3	2	16	0.340

Discussion:

Prolonged pregnancy is a subject of interest because of its presumed association with increased fetal morbidity and mortality.

Placental insufficiency is postulated to be the cause of the adverse obstetric outcomes associated with prolonged pregnancy^[10]. The failing placenta has been demonstrated to be accompanied by a reduction in the volume of amniotic fluid^[11]. Thus, any fetal risk secondary to the failing placenta is compounded by the possibility of umbilical cord compression during uterine contractions due to the oligohydramnios^[6, 12].

The association between oligohydramnios and deteriorating placental function makes ultrasound assessment of amniotic fluid a useful screening test for the prediction of an adverse outcome.

Ultrasound assessment of amniotic fluid volume has been widely introduced into clinical practice as a method of fetal surveillance and it has been suggested that an AFI less than five cm. should be considered abnormal^[13].

In this study, 12 (24%) women had AFI of less than 5 cm. This figure is lower than the study group of Phelan who found 36% of women in his study has AFI < 5cm^[14].

Oligohydramnios, as defined by an AFI < 5 cm. was significantly associated with caesarean section for fetal distress than those babies with an AFI > 5 cm. As such our data revealed that the rate of caesarean section for all cases was 30% and it is statistically significant $P = 0.031$. This is in agreement with findings of Michael⁵ who found an

over all incidence of caesarean deliveries of 28% while Wenstrom found a 34% of his study group delivered by caesarean section and this figure is greater than our findings.

Ratko Motigevi. Investigate the relation between AFI and neonatal outcome, he choose 124 patients with prolonged pregnancy and he found a non-significant number of babies born with A/S < 7 at 5 minutes^[15]. These findings were in agreement with our study as three babies delivered with A/S < 7 at 5 minutes $P = 0.340$. This finding is attributed to the careful and close observation of labour and prompt interference before the occurrence of severe hypoxia.

Our data shows a statistically significant correlation between oligohydramnios as evidenced by a reduced AFI and meconium staining liquor ($P = 0.004$). This was in agreement with Michael who studied a longitudinal measurement of AFI in postterm pregnancies and it's association with fetal outcome, he found a significant increase in meconium staining in patients with oligohydramnios $P = 0.007$ ^[5].

In spite of this significant increase in meconium staining we found only three babies require admission to the NCU. This was statistically not significant ($P = 0.340$) while Ratko reported no admission to the NCU for meconium aspiration^[15]. This finding can be attributed to the perfect resuscitation of the newborn babies in the form of immediate suction of the nasopharynx prior to first breathe.

In this study there were no babies born with less than 2500 g, which may indicate that women with growth-restricted fetuses may have been identified earlier in the antenatal period.

Our data shows no intrapartum or perinatal death and this finding was in agreement with Ratko and Albert Einstein study¹⁵. This result can be explained by close observation of fetal and maternal condition during labour and delivery. Early detection of fetal distress and early interference at a proper time.

We conclude that oligohydramnios as evidenced by a reduced AFI is associated with adverse perinatal outcome whether defined by meconium aspiration or fetal distress in labour and AFI can be considered as a useful technique in fetal surveillance ≥ 42 weeks gestation.

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