

Amniotic fluid index versus largest vertical pocket in the prediction of perinatal outcome in post-term pregnancies

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Abstract. We studied a cohort of 41 singleton pregnancies induced at term with prostaglandins and, when necessary, oxytocin. We evaluated with ultrasound the amniotic fluid index (AFI) and the largest vertical pocket (LVP), at least 2 days before the delivery, to compare the sonographic measurement of amniotic fluid with fetal distress and perinatal outcome. We analysed the incidence of fetal distress using intrapartum monitoring of fetal heart rate, considering the absence of variability, the presence of persistent severe variable and/or late decelerations. The oligohydramnios group, independently by ultrasound index, showed the same incidence of abnormal FHR, and rate of Cesarean section for fetal distress as the group with normal amniotic fluid. In conclusion there is no significant difference between the group of patients with oligohydramnios and the one with normal amniotic fluid regarding the perinatal outcome in induced labor.

Key words: Oligohydramnios, post-term pregnancy, amniotic fluid index, largest vertical pocket, ultrasound

Introduction

The mechanisms that cause a decrease in amniotic fluid volume (AFV) in postterm pregnancies are not completely understood: it is supposed to be a decreased placental function and/or a reduction of fetal urine production due to a decreased fetal renal flow (1).

In pregnancies beyond 40 weeks of gestation AFV is an important predictor of fetal well-being and the presence of oligohydramnios was usually associated with an increased risk of fetal heart abnormalities, meconium-stained amniotic fluid and cesarean sections for fetal distress (2).

As a result, the sonographic detection of AFV has been used in the ante-partum monitoring of postterm pregnancies.

In 1980 Manning suggested measuring the single deepest pocket of amniotic fluid and defined oligohydramnios as the presence of one single pocket with a

depth <1.0 cm; in 1995 (3) he redefined a normal amniotic fluid as one single pocket at least of 2.0 cm.

In 1987 Phelan et al. (4) described the Amniotic Fluid Index (AFI) as a semi-quantitative measurement of maximum vertical pockets of amniotic fluid in each quadrant of the uterus and defined oligohydramnios as an AFI less than 5 cm.

Many studies have shown that the LVP and the AFI method have equal diagnostic accuracy (5).

Other studies suggest that, for the detection of oligohydramnios, the single pocket <2 cm had a sensitivity of 9.5% and an AFI <5 cm had a sensitivity of 1.8% (6).

Actually there is no consent in literature regard the efficacy of Amniotic Fluid Index or Largest Vertical Pocket to quantificate the amniotic fluid volume and which one of these methods is better related to adverse perinatal outcome.

Because oligohydramnios is generally associated with decelerations of the fetal hearth rate (FHR), so-

me authors have proposed to treat pregnancies complicated by oligohydramnios at term with prophylactic amnioinfusion to relieve umbilical cord compression during labour (7, 8). Infact, some data show that women with oligohydramnios, who receive intrapartum amnioinfusion, had a lower incidence of Cesarean sections for FHR abnormalities (9).

There is no consent in literature regarding the real effectiveness of prophylactic amnioinfusion because there are other important studies demonstrating that amnioinfusion should be reserved for labouring patients with variable FHR deceleration, rather than for all patients with oligohydramnios. This was also confirmed by Hofmeyr in a Cochrane review of the litterature (10).

Aim of the study

The purpose of this study was to investigate if the perinatal outcome varies in induced pregnancies in function of normal or abnormal amniotic fluid volume measured using the amniotic fluid index (AFI) and largest vertical pocket (LVP).

Methods

We examined 41 singleton pregnancies at term (mean gestational age of 40.5 weeks, range 37-41.6 weeks) at the University of Parma between May and August 2003. All were uncomplicated pregnancies, without any severe maternal disease. All the patients were studied during pregnancy with ultrasound for the detection of major fetal abnormalities and we excluded from our study all the pregnancy with fetal anomalies.

All the patients were subjected to an ultrasound scan for the determination of both the AFI and the LVP at least 2 days before the delivery.

All the deliveries were induced using local application of prostaglandin E₂ for cervical ripening and, if necessary, augmentation with infusion of oxytocin. The indications for induction of labour were: reduction of amniotic fluid volume, post-term pregnancy, prevention of fetal macrosomia, mild pregnancy-induced hypertension.

We divided our patients into three groups: Group A with AFI ≤ 5 cm and LVP ≤ 2 cm, Group B with AFI ≤ 5 cm but LVP > 2 cm and Group C with AFI > 5 cm and LVP > 2 cm. Among the three groups we have evaluated the incidence of fetal distress using intrapartum monitoring of fetal heart rate, considering the absence of variability, the presence of persistent severe variable and/or late decelerations (11, 12).

We also studied the incidence of vaginal delivery versus Cesarean section and the Apgar scores at 1st and 5th minute after birth.

For the evaluation of adverse perinatal outcome a statistical analysis using *T-student test*, *Chi-Square*, *Fisher's exact test* was performed.

Results

The incidence of oligohydramnios, considered as AFI < 5 cm, was of 36 % (15/41 patients), with mean AFI of 3.8 cm and mean LVP of 2.6 cm.

In Group A (7 patients) the mean AFI was of 3.5 cm and the mean LVP was of 1.7 cm. In Group B (8 patients) the mean AFI was of 4.08 cm and the mean LVP was of 2.3 cm; in Group C (26 patients) the mean AFI was of 12.3 cm and the mean LVP was of 4.2 cm.

The AFI values in group C are statistically higher than in groups A and B ($p < 0.05$).

The LVP values resulted statistically different in all 3 groups (A, B and C): this could mean that in group B the mean LVP, though remaining higher than 2 cm., is however inferior of mean values of LVP in patients of group C, with normal AFI.

The three groups of patients were omogeneous for gestational age at the moment of labour induction and delivery.

The incidence of fetal distress in the whole population was 12% (5/41) and there is significant difference the three groups, both during induction of labour and the active phase of labour.

Among the three groups there was no significant difference in overall Cesarean section rate and Cesarean rate for fetal distress: we had only two cases in group C because of prolonged variable deceleration. The overall rate of Apgar scores under 7 at 1 minute

Table 1. Perinatal outcome in relation to amniotic fluid volume assessed by amniotic fluid index (AFI) and largest vertical pocket (LVP)

41 patients	Group A (AFI ≤5cm, LVP ≤2 cm)	Group B (AFI ≤5cm, LVP >2 cm)	Group C (AFI >5 cm, LVP >2 cm)
Gestational age	40wks+6days	39wks+3days	40wks+3days
AFI	3.55 cm	4.08 cm	12.3 cm *
LVP	1.7 cm **	2.3 cm	4.2 cm ***
Non reassuring fetal heart rate	14%	0%	15%
Cesarean section for fetal distress	0%	0%	7%
Apgar score - 1 st min <7	14%	12%	4%

* p<.05 group C vs group A and group B; ** p<.05 group A vs group B and group C; *** p<.05 group C vs group A and B

was 12.5 % (1/8) in Group B, 14.2 % (1/7) in Group A, and 4 % (1/26) in Group C, and neither this was significantly different.

Conclusion

From the analysis of our data there was no significant difference between the group of patients with oligohydramnios and the group with normal amniotic fluid regarding the perinatal outcome. Even when considering only the two groups of patients with AFI ≤5 cm (Group A and Group B) we were not able to identify differences regarding the incidence of fetal and neonatal distress.

In our patients with oligohydramnios we can find a difference between the values of AFI and LVP, because only 46% of the cases with AFI <5 cm, had the LVP <2 cm.

In other words, when the amniotic fluid was quantified with LVP, over a half of the patients with AFI <5 cm would be considered normal.

It's also worth mentioning, that patients with AFI <5 cm when the LVP was more than 2 cm (group B) resulted statically less to that observed in those cases with AFI >5 cm.

From our data there is not difference between patients with oligohydramnios and normal amniotic fluid, regarding the FHR during labour and the rate of Cesarean sections for fetal distress. Even in the group

with oligohydramnios neither the AFI, nor the LVP are able to predict adverse perinatal outcome.

Cesarean sections carried out due to fetal distress resulted the same in all group considered, hence indicating that in physiologic term or post-term pregnancies, the amount of amniotic fluid, even though reduced, do not alter labour.

These preliminary data confirm what Hofmeyr concluded in the Cochrane that because there is no difference in the incidence of fetal distress in patients with oligohydramnios, reaching the normal amniotic fluid volume (with amnioinfusion) does not change the outcome of these babies.

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